THE ROEBLING SYSTEM OF FIRE-PROOF CONSTRUCTION.

THE ROEBLING CONSTRUCTION COMPANY,
121 Liberty Street, NEW YORK CITY.

E. D. HOFELLER,
96 ERIE COUNTY BANK BUILDING,
BUFFALO. N. Y.

Introduction.

THE STANDARD methods of fire-proof construction, as erected by The Roebling Construction Company, are illustrated and described in detail in the following pages. The special adaptation and uses of each construction, with tables of weights, and other *data* are also given as an aid to intelligent and economical designing.

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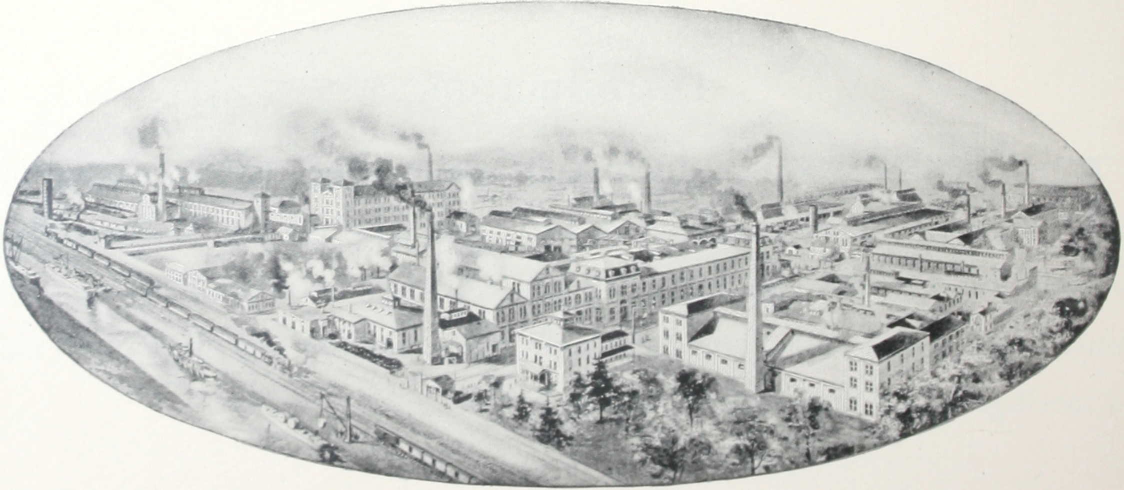


Works of John A. Roebling's Sons Company,

Trenton, N. J.

Fire-proof Construction.

FIRE-PROOF CONSTRUCTION as an economic feature of modern buildings has in recent years attained a position of great importance. The permanent character of fire-proof buildings, their superior sanitary conditions, the immunity they offer the owner from loss by fire, the security of life and property to the tenant, as well as the greatly reduced rate of insurance,—are advantages which fully warrant the additional expense of making the better class of buildings fire-proof.

The problem of fire-proofing buildings successfully and economically involves many complicated and conflicting conditions, and is very difficult to solve. Of the numerous methods or systems now on the market only a very few fulfill the requirements satisfactorily, and some of these are so expensive as to preclude their extensive use.

The very unsatisfactory manner in which many so-called fire-proof buildings resisted the action of fire and water in actual conflagrations, and the utter lack of precise knowledge on the subject of fire-proof construction, induced John A. Roebling's Sons Company six years ago to undertake a careful investigation of the subject of fire-proofing. The problem was then, for the first time, considered from a scientific standpoint, and was treated precisely as any other engineering problem. With a corps of able engineers, machinery to execute any mechanical device, a complete fire-extinguishing equipment and numerous basic patents embracing a wide range of multiform construction, the facilities of this Company for reaching definite and practical results have been for some years unique. Many costly but instructive tests have been made to determine not only the best material, but also the most advantageous and economical methods of employing it. These tests established the wonderful fire and water resisting properties of "cinder" concrete (composed of high-grade Portland cement, sand, and the residue of anthracite coal consumed in steam boilers), and led to its adoption as a fire-proof material.

In this systematic manner and by carefully noting and considering the practical conditions in buildings in the course of erection, the present improved and effective forms of construction have been evolved.

The various types of fire-proof floors *as herein shown and specified* have been subjected to crucial and exhaustive tests with eminently satisfactory results. They will, for the purposes designated, develop ample strength, afford efficient protection to the supporting iron work in case of fire, provide ceilings that will not crack or discolor the plaster, prove economical in material, and fulfill every other requirement of practical and first-class construction.

Fire-proofing contracts are executed by The Roebling Construction Company, of New York City, N. Y., and Trenton, New Jersey. With a large force of skilled and experienced workmen, our facilities for fulfilling large contracts and for erecting work rapidly are unequalled.

THE ROEBLING CONSTRUCTION COMPANY.

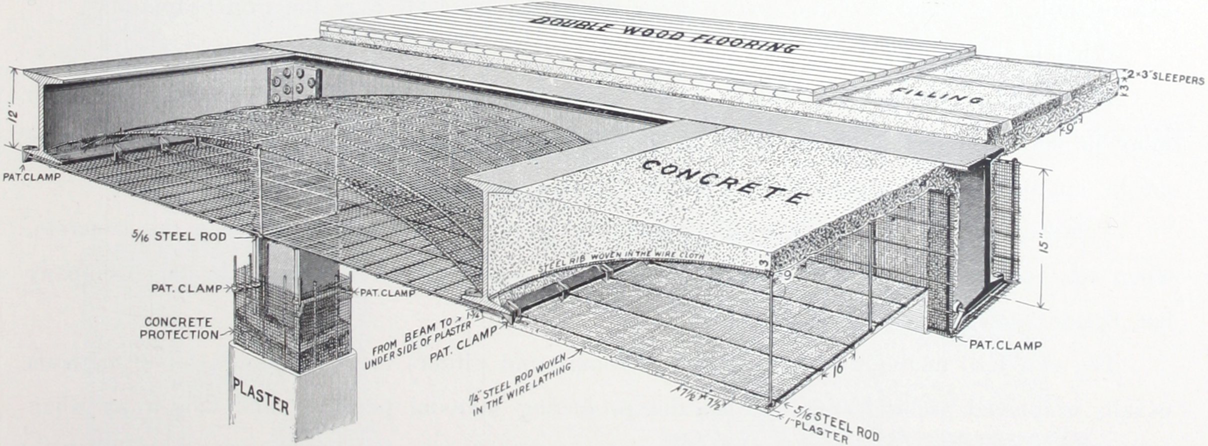
Fire-proof Floors.

System A.

THE "SYSTEM A," or arch construction, with flat ceiling, is illustrated on the opposite page. It consists of a wire cloth arch, stiffened by *woven in* steel rods, which is sprung between the floor beams, and abuts into the seat formed by the web and lower flange of the I beams. On this wire centering Portland cement concrete is deposited and allowed to harden. The result is a pleasing monolithic construction, admirably adapted for a fire-proof floor.

The ceiling consists of a system of supporting rods attached to the lower flanges of the floor beams by a patent clamp which offsets the rods below the I beams. Under these rods, and securely laced to them, is the Roebling Standard Wire Lathing, with the *woven in* ¼-inch solid steel stiffening ribs crossing the supporting rods at right angles. This construction produces a ceiling absolutely free from any of the usual defects.

System A—Arch Construction.



Every observant architect and builder has noted the unsightly cracks that develop after a few years in the mosaic, tile, and granolithic floors of many of our public buildings. Upon examination it is found that the cracks occur at regular intervals over the iron beams.

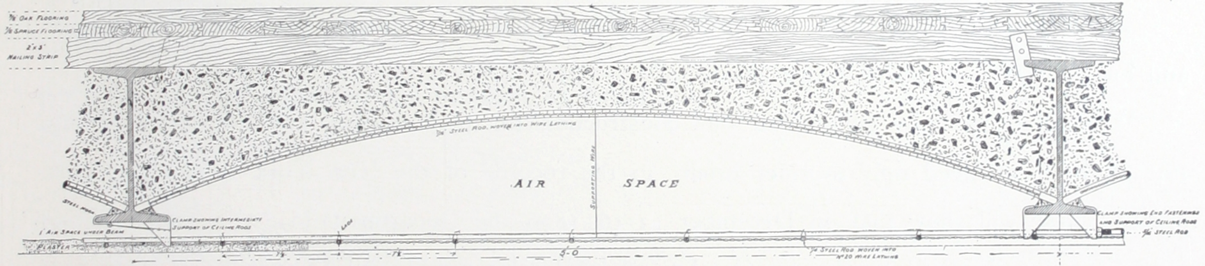
What is the cause?

The arches have settled. Floor arches consisting of a number of assembled parts, with more or less imperfect joints, whether flat or segmental in form, *invariably settle.* This causes cracks not only in the expensive floor finish but also in the plastered ceilings.

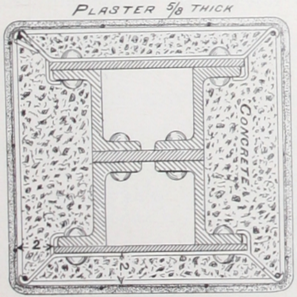
A segmental concrete arch, as illustrated on page 11, *never settles,* because the concrete, when set, becomes a monolith, or single piece. The concrete arch as erected by this Company has, besides, considerable elasticity.

The standard methods of fire-proofing columns and girders are also shown. The methods usually employed are defective, in that the protecting material peels off and falls away when exposed to a hot fire.

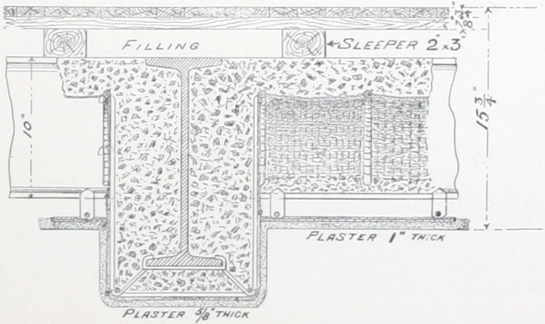
System A—Type 1.


7/8" OAK FLOORING
7/8 SPRUCE FLOORING
2"x3" NAILING STRIP
STEEL ROD
CLAMP SHOWING INTERMEDIATE SUPPORT OF CEILING RODS
1" AIR SPACE UNDER BEAM
PLASTER
LACE
7½
5-0
STEEL ROD, WOVEN INTO WIRE LATHING
SUPPORTING WIRE
AIR SPACE
CLAMP SHOWING END FASTENINGS AND SUPPORT OF CEILING RODS
STEEL ROD
STEEL ROD WOVEN INTO No 20 WIRE LATHING

Adapted for Public Buildings, Offices, Theaters, Hotels, Schools, Churches, Banks, Libraries, Hospitals, Residences, etc.



Typical Column Section.



Typical Girder Section.

There is a prevailing idea that nothing quite equals the ordinary brick arch in strength and low cost for warehouse construction.

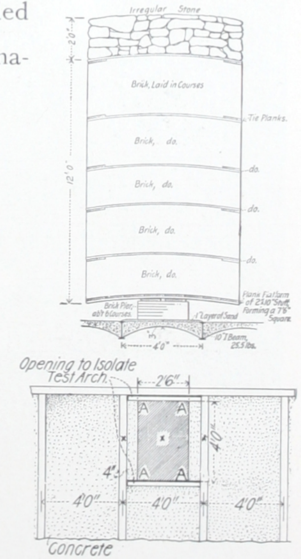
We have repeatedly substituted our construction for brick arches and effected a saving. For strength we need only to refer briefly to the records of the New York Building Department These will show that on December 13–16, 1896, the Department loaded a 4-foot section of our flooring that had previously (October 28, 1896,) been subjected by them to a fire test of five hours, at a temperature of 2000° to 2350° Fahrenheit, and then cooled by a stream from a regulation fire engine. Timber supports were placed under the iron beams and narrow openings cut through the concrete from beam to beam, so as to completely separate the section to be tested from the rest of the floor. A brick pier 1 foot high was built over the middle portion of the arch and a platform 7½ feet square, on which the test load was placed, rested on the pier.

The position of the load on the arch is shown clearly by the shaded area in the cut. The official report of the Building Department summarizes the test load supported by the arch, as follows:

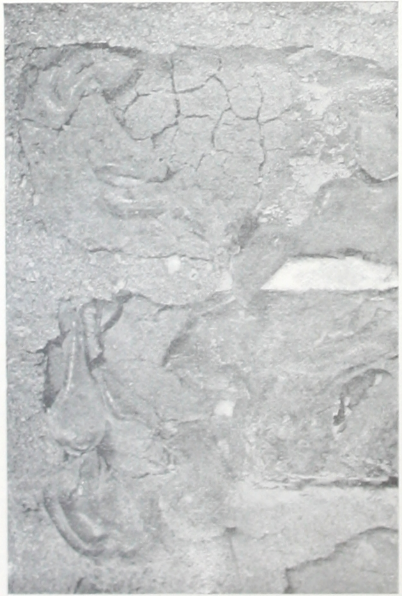
"Brick, .	38,000 lbs.
Stone, .	2,000 "
Planking,	550 "
Three men,	450 "
Total,	41,000 "

which was distributed over an area of 10 square feet=4100 pounds per square foot."

This load is equivalent to a solid brick pier having the same base as the pier supporting the test load, and 33 feet in height. The arch tested was identical in every respect with the regular construction as furnished under contract by this Company in New York City.



Test load after arch had been tested with fire and water by New York Building Department.



Portion of brick wall in interior of test structure.

We are often asked the question:

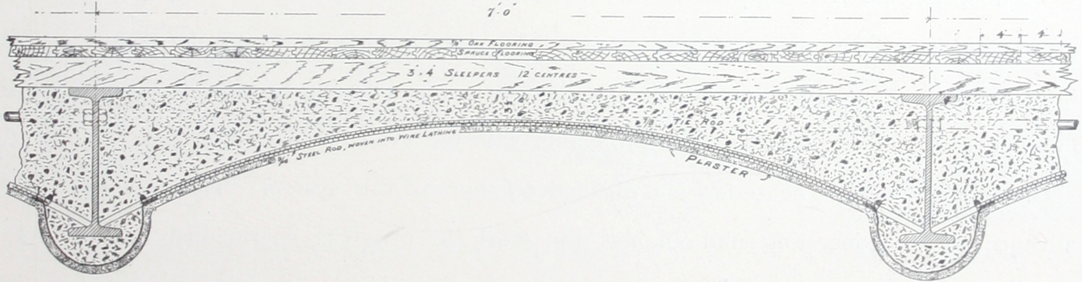
Are your concrete arches as fire-proof as brick arches?

The illustration on this page is from a photograph of the interior surface of the brick side walls of the structure in which our concrete arches were tested by the New York Building Department, on October 28th, 1896.

The high temperature maintained during the test melted the brick; the fused material turned black and slid down in some places, while in other places it still hung to the walls in nodules as shown. The effect of the same temperature on our concrete arches is thus described in the official report: "The concrete arch proper seemed not to be affected in any way by the fire and water," etc.

System A—Type 2.

WAREHOUSE CONSTRUCTION.



For factories, warehouses, stores, freight depots, breweries, etc., where great strength and economy in space and cost is desired and for any building which may become the repository of large quantities of inflammable goods.

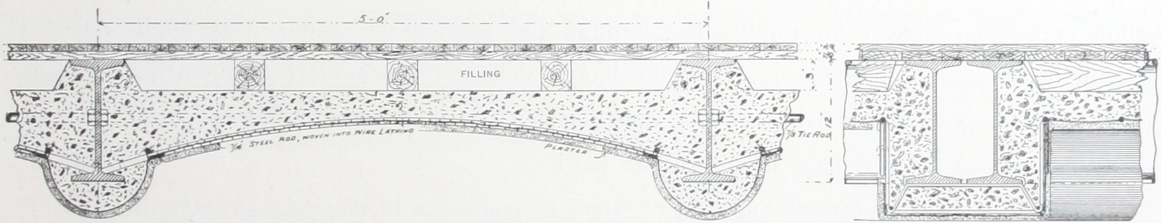
The concrete around the soffits of the beams and girders being filled in at the same time as that in the arches, the whole construction becomes a monolith completely encasing the iron-work and protecting it more effectually than by any other method in use at the present time.

A monolithic construction in the form of a segmental arch is unquestionably the strongest, most economical, and best adapted for a fire-proof floor. The material is disposed so that the entire section is in compression. This secures the maximum strength of the concrete without resorting to light metal elements in the construction. The massing of the fire-proofing material about the beams affords also superior protection with the available material.

The permanent wire centering is a distinctive feature of this system. This is always erected in advance of the concreting and enables the work to progress continuously. It allows the superfluous water to drip out of the concrete as soon as it is in position and, as both the upper and lower surfaces of the concrete are exposed to the air, the most favorable conditions for rapid drying are secured. The wire centering is, besides, a valuable safeguard, having saved the lives of many workmen who have fallen on it from aloft. It also protects the workmen against any possibility of breaking through damaged spots in the flooring.

System A—Type 2.

WAREHOUSE CONSTRUCTION, WITH SLEEPERS DEPRESSED.



By dispensing with the flat ceiling finish, the cost is considerably reduced. A further saving is effected in the plastering, owing to the fact that only two coats are necessary in plastering against the under surface of the arch. When the beams are not spaced too far apart and no piping is to be placed transversely over the beams, the sleepers may be depressed below the top flanges of the beams, thus reducing the total depth of the floor by the depth of the nailing sleepers. Air spaces under the beams can be conveniently provided if desired.

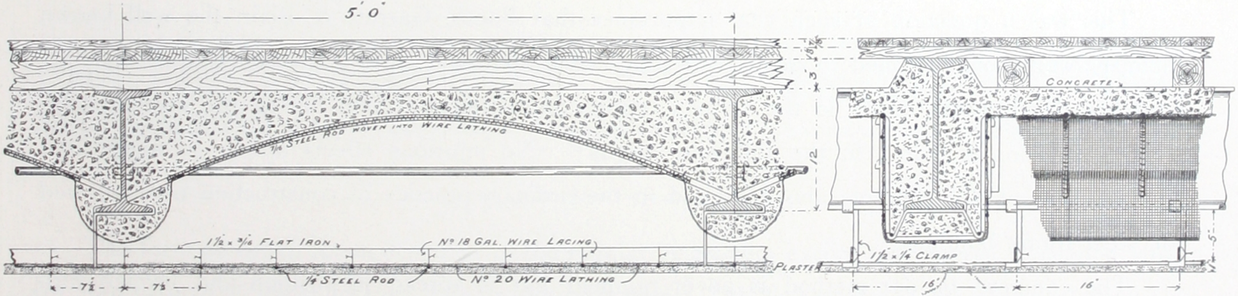
Every architect knows the importance of first class plaster work in handsomely finished buildings and how seldom the best results are obtained. Who has not observed the brown and yellow spots that almost invariably show through the plaster soon after it is applied, to say nothing of the unsightly cracks that develop later? These blemishes are frequently so conspicuous as to mar seriously the beauty and richness of a highly meritorious execution.

What causes these defects in the plaster work?

Materials that yield up coloring matter when in contact with plaster; surfaces that do not provide a suitable key for plaster; the slight displacement of the assembled parts constituting the surface to which the plaster is applied.

The light steel and wire ceilings shown on pages 11, 19, 25, and elsewhere, have been erected by this Company for many years. Plaster applied to these wire ceilings *never sags* nor *cracks* and *never discolors.* These are important *desiderata* where expensive fresco work or other elaborate ornamentation is contemplated.

System A—Type 3.



Adapted for department stores, halls of record, banks, libraries, etc., in which the most efficient fire-proof construction, as well as ornamental interior finish, are desired.

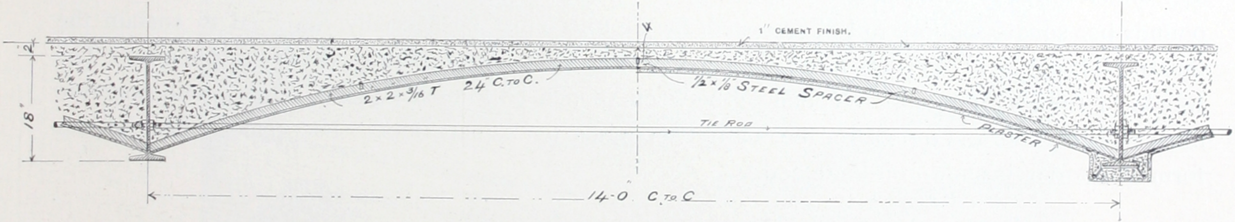
The type of floor here shown is the most effective fire resisting construction at present available at a reasonable cost. The ceiling may be adjusted at any level below the beams to admit piping, etc., as may be desired.

Will cinder concrete rust iron?

This was a question of such vital importance that Booth, Garrett & Blair, the well known chemists, were commissioned to make a thorough investigation. Their experiments and examinations are described in detail in the various reports submitted by them during the investigation. Their conclusion is stated in the following words: "No injurious effects are to be anticipated from the use of this concrete above ground in the ordinary practice of construction now followed for steel frame buildings."

The concrete by our method is never rammed but is spread in position and leveled with shovels. This insures lightness and preserves its highly porous character—an essential property of the concrete, if it is to withstand violent changes of temperature without disintegration. The porosity of the material, the rapid elimination of moisture after it is placed in position, and other special conditions, permit the installation of this system of fire-proofing at lower temperatures than any other.

System A—Type 4.



This form of construction is similar to the regular A System except that curved T section ribs are used instead of the solid steel rods, in the arch wire. The Ts are of suitable sectional area to support the required loads and are spaced 2 feet apart and held rigidly in position by means of steel spacers. Painted wire lath with a woven-in stiffening rib is then laid between the Ts and laced to them. On this permanent centering, Portland cement concrete is laid in the regular manner, the webs of the T ribs being imbedded in the concrete.

This form of construction is used where the beams or supports are more than 10 feet apart.

The regular practice in regard to the tie rods is sufficient for the usual loads and for spans up to 12 feet under ordinary conditions. In spans greater than 12 feet and where loads greater than 500 pounds per square foot are to be supported, the tie rods must be specially designed to sustain the thrust. This style of floor has been installed with success up to 18 feet between supports. The weight of the concrete and imbedded Ts between 18-inch I beams at 14-feet centers with concrete filled 2 inches over the top of the beams is 65 pounds per square foot. The ceiling effect of this form of flooring is shown on Page 20d.

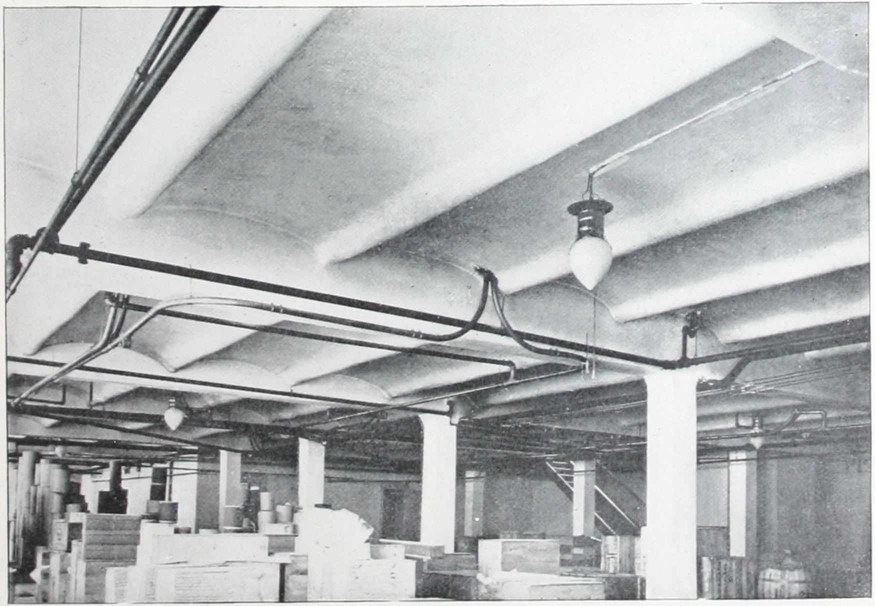
Specification.

System A—Type 4.

FLOORS.—The fire-proof floors between the steel beams shall be the Roebling, System A, Type 4, construction. T-shaped steel ribs shall be curved so as to form a segmental arch; these to be set at right angles to the beams, parallel to each other and 24 inches apart. Steel spacers ½ x ⅛-inch shall be set at intervals of 4 feet or less over the webs of the ribs to hold them rigidly in position. Over these ribs and resting on the flanges of the Ts, lay painted wire lath with a stiffening rib *woven in* every 7½ inches; the wire being laced securely to the T-iron ribs with No. 18 galvanized lacing wire. On this T-iron and wire centering so constructed, fill cinder concrete mixed in the proportion of 1 part high-grade Portland cement to 2½ parts of sharp sand and 6 parts of clean cinder or boiler ashes, making the thickness of the concrete at the crown of the arch not less than four inches; the concrete to finish generally two inches over the top flanges of the beams.

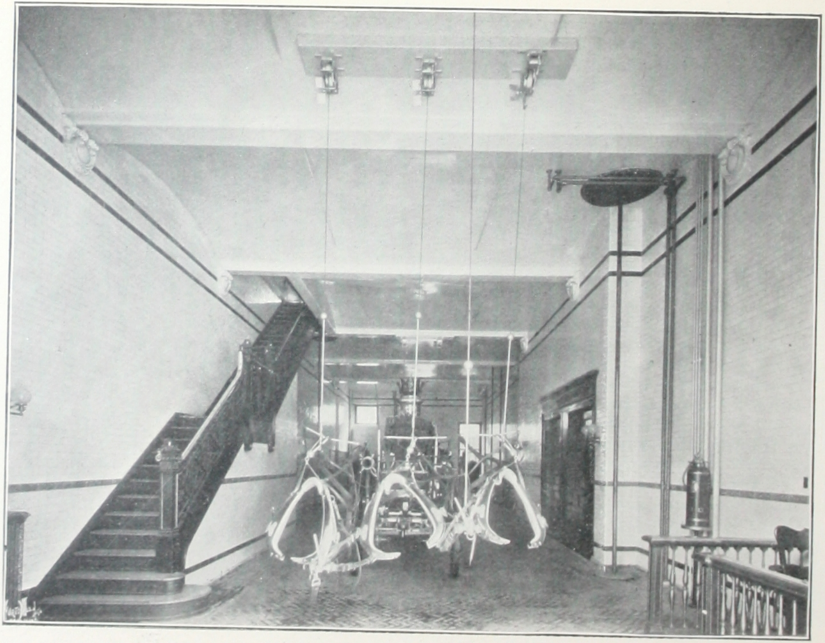
The flooring to be subject to test at any points that may be designated by the architect. It shall, in all cases, develop a strength in 30 days equal to the capacity of the supporting steel work.

COLUMNS AND GIRDERS.—Specification the same as for System A, Type 1, page 22.



Ceiling effect of System A—Type 2.

Illustrating warehouse construction and the small damage to the flooring in cutting openings for the installation of piping, electrical equipment etc,



Illustrating Ceiling Effect of System A—Type 4,

as erected in House of Engine Co. No. 74 at 207 W. 77th St., New York.

Horgan & Slattery, Architects.

System A.

TABLE OF WEIGHTS, SPACING OF BEAMS, ETC.

When concrete is to be leveled above under side of floor beams to a height of	Maximum spacing of iron floor beams (independent of size of beams) should not exceed	Thickness of crown at center of arch.	Weight per square foot including only concrete and wire.
8″	4′ 0″	3″	33 lbs.
9″	4′ 6″	3″	34 “
10″	5′ 0″	3″	36 “
12″	6′ 0″	3″	41 “
15″	7′ 6″	3″	47 “

The weights given are for the concrete filled to the level indicated in the first column, with a thickness of 3 inches at the crown of the arches and for the wire centering. Concrete mixed in the proportions specified on page 22, and as manipulated in this construction, will average 80 pounds per cubic foot.

For flat-ceiling construction and plaster in Types 1 and 3, add 10 pounds per square foot. For plaster in Type 2, add 9 pounds per square foot. Three coats are required to plaster the flat-wire ceilings—a “scratch” coat, a “brown” coat, and a “finishing” coat. The segmental ceilings in Type 2 require only two coats—a “brown” coat, and a “finishing” coat.

The weight of the beams and girders, of the wood or other finished floors, and of the filling between sleepers, if any,* must also be added for the total dead load of the floors.

All floor beams should be tied together, at intervals of about eight times their depth, and should be framed level and flush on the under side where flat ceilings are desired.

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*See note at foot of page 30.

Specifications.

System A—Type 1.

(See page 11).

FLOORS.—The fire-proofing between the steel floor and roof beams shall be the Roebling "System A" or Arch Construction, consisting of a steel ribbed wire cloth centering and a cinder concrete arch.

The wire centering shall consist of No. 22, four-warp, two-filling wire cloth stiffened with ⅜ to ½-inch steel rods woven into the cloth at intervals of about 9 inches. This centering shall be sprung in between the I beams in the form of an arch with the ends of the rods abutting into the seat formed by the web and lower flange of the I beams; the sheets to be well lapped and securely laced.

On the wire centering so constructed, cinder concrete, mixed in the proportions of 1 part of high grade Portland cement to 2½ parts of sharp sand and 6 parts of clean cinder, shall be laid, providing a thickness of not less than 3 inches at the crown of the arch, the concrete generally to be filled flush with the tops of the floor beams, leaving the floors ready for nailing sleepers.

The flooring to be subject to test at any points that may be designated by the architect. It shall in all cases develop a strength, in 30 days, equal to the capacity of the supporting iron work.

CEILINGS.—The ceilings over — stories shall be flat supporting rods or bars, spaced 16 inches apart, and shall be securely fastened transversely to the under side of the I beams by suitable iron clamps. In all spans over 3 feet 6 inches a 5⁄16 inch steel rod shall be laid over and laced to the supporting rods or bars in the middle of the span. To this rod shall be attached supporting wires dropped from the crown of the floor arches, at intervals not exceeding 32 inches. Painted wire lathing stiffened with a ¼-inch solid steel rib woven in every 7½ inches, shall be applied to the supporting rods or bars with the ribs crossing them at right angles; the ribs in the lathing to be securely laced to the supporting rods or bars at every intersection with No. 18 galvanized wire. All ceilings to be finished ready for plaster.

COLUMNS.—All free columns are to be incased by painted wire lathing, stiffened with a ¼ inch solid steel rib woven in every 7½ inches. Suitable light iron furring shall be provided so as to offset the lathing at least 2 inches from the column and finish round or square, as shown on the plans. The space between the column and the wire lathing to be filled solid with concrete, and the surface to be left ready for plaster.

GIRDERS.—All girders projecting through the ceilings shall be incased by painted wire lathing, stiffened with a ¼-inch solid rib woven in every 7½ inches. The lathing to be rigidly supported by suitable light iron furring, built out so as to offset the wire at least 2 inches from the girder. The space between the girder and the wire lathing to be filled solid with concrete, and the surface to be left ready for plaster.

System A—Type 2.

(See pages 15 and 17.)

FLOORS.—Specification for Floors same as for Type 1.

CEILINGS.—The ceilings over — stories shall be arched or segmental. The beams, in all cases, shall be incased by wire lathing bent to form and fastened to the wire centering on both sides of the beams, so as to provide a space of at least 2 inches between the beams and the wire lathing. This space to be filled in solid with concrete. The under surface of the arches to be left ready for plaster.

COLUMNS AND GIRDERS.—Specification the same as for Type 1.

System A—Type 3.

(See page 19).

FLOORS.—Specification the same as for Type 1.

CEILINGS.—The floor beams, in all cases, shall be incased with wire lathing, bent to form and fastened to the wire centering on both sides of the beams so as to provide a space of at least 2 inches between the beams and the wire lathing This space to be filled solid with concrete. Provide suitable clamps or hangers so as to suspend a wire ceiling to finish —— inches below the beams when plastered. These hangers to support flat iron bars set on edge and spaced 16 inches apart. In all spans over 3 feet 6 inches, a $\frac{5}{16}$-inch steel rod shall be laid over and laced to the flat iron bars in the middle of the span. To this rod shall be attached supporting wires dropped from the crown of the arch, at intervals not exceeding 32 inches Painted wire lathing, stiffened with a ¼-inch solid steel rib woven in every 7½ inches, shall be applied to the under side of the flat iron bars, with the ribs crossing them at right angles. The ribs in the lathing to be securely laced to the bars, at every intersection, with No. 18 galvanized wire. All ceilings to be finished ready for plaster.

COLUMNS AND GIRDERS.—Specification the same as for Type 1.

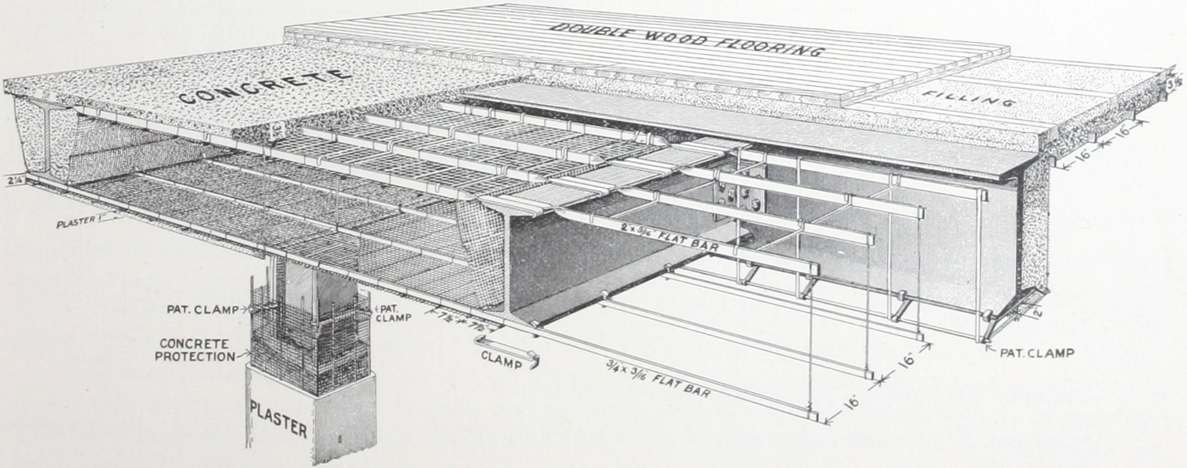
NOTE.—The usual practice is simply to apply plaster to the wire lathing around the columns and girders. Filling the space between the iron member and the wire lathing secures a vastly superior protection and involves only a slight additional expense.

The importance of protecting the essential members of the steel framework in an efficient manner should appeal strongly to the intelligent architect and owner.

System B.

The "System B" or flat construction is illustrated on page 25. It consists of a light iron frame-work imbedded in concrete and spans the interval between the iron beams in the form of a slab. The light iron frame-work consists of flat iron or steel bars set on edge and spaced 16 inches, center to center, with a ¼ turn at both ends where the bars rest upon the iron beams. Spacers of half oval iron are placed at suitable intervals to separate and brace the bars. The Roebling Standard Wire Lathing with the ¼-inch solid steel stiffening rib *woven in* every 7½ inches, is applied to the under side of the bars; the stiffening ribs running crosswise under the bars and laced to them at every intersection. On the wire lathing so supported, cinder concrete is deposited, thoroughly imbedding the light iron work. The same ceiling construction as shown in "System A" may be used with this system. Flat iron bars set on edge are sometimes substituted for the rods in wide spacing of beams. The ceiling when plastered finishes 2¼ inches below the under side of the floor beams.

System B—Flat Construction.



"System B" is intended to meet the requirements of a light, low-priced floor adapted to wide spacing of beams.

Where very shallow floors are desired, the beams may be set on the lines of the partitions and the plaster applied directly to the under side of the concrete, omitting the wire ceiling. This system is practicable between beams spaced 10 to 12 feet apart.

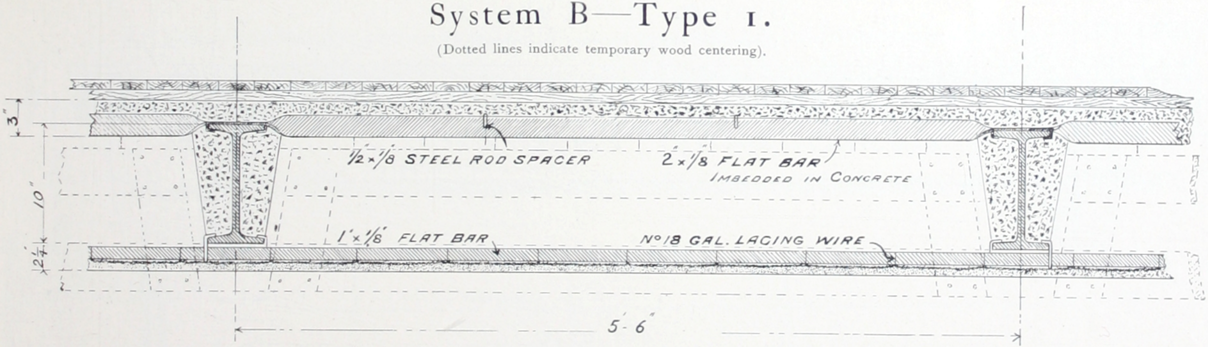
The flat iron bars set on edge act as beams and support the wire lathing and superimposed concrete while it is green, requiring only a few intermediate timber supports in wide spans. After the concrete has set, the bars, spacers, and rods become tension members. The ends of the bars being bent around the iron beams, the entire tensile strength of the bars is developed before the floor can fail. This method of attaching the bars ties the iron beams rigidly together every 16 inches and obviates the necessity of tie rods.

Columns and girders are treated as in "System A."

"System B" involves the use of merchant iron solely. This is a marked advantage in erecting floor work promptly at isolated points.

System B—Type 1.

(Dotted lines indicate temporary wood centering).



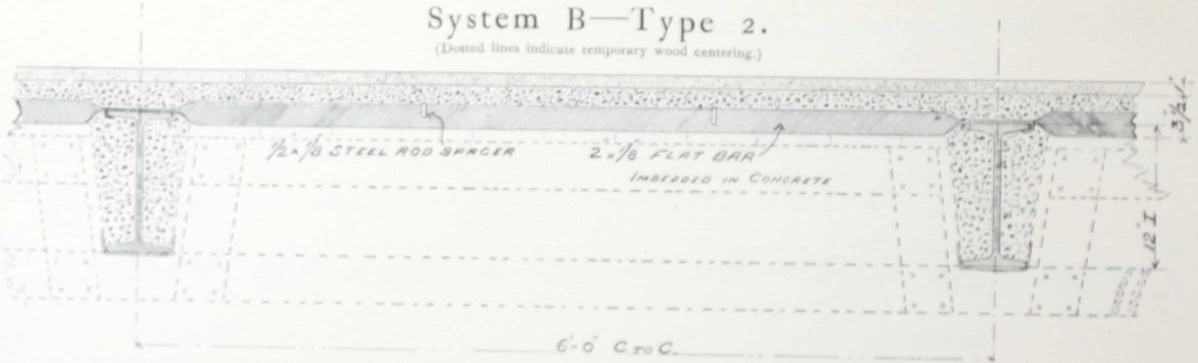
The cinder concrete as regularly furnished receives and holds nails admirably. Lightness and economy may consequently be further realized by dispensing with the usual nailing sleepers and the sleeper fill, and nailing the rough under-flooring directly to the concrete; the finished flooring being laid over the rough flooring as shown.

The wire centering is always preferred if the work is to be erected during cold weather, as it permits the moisture to drip away rapidly and prevents the concrete from being injured by freezing. The wire centering also produces an exceedingly rough surface, affording an excellent key for the plaster when applied directly to the under side of the concrete.

In moderate temperatures and where a number of workmen at other trades are obliged to

System B—Type 2.

(Dotted lines indicate temporary wood centering.)

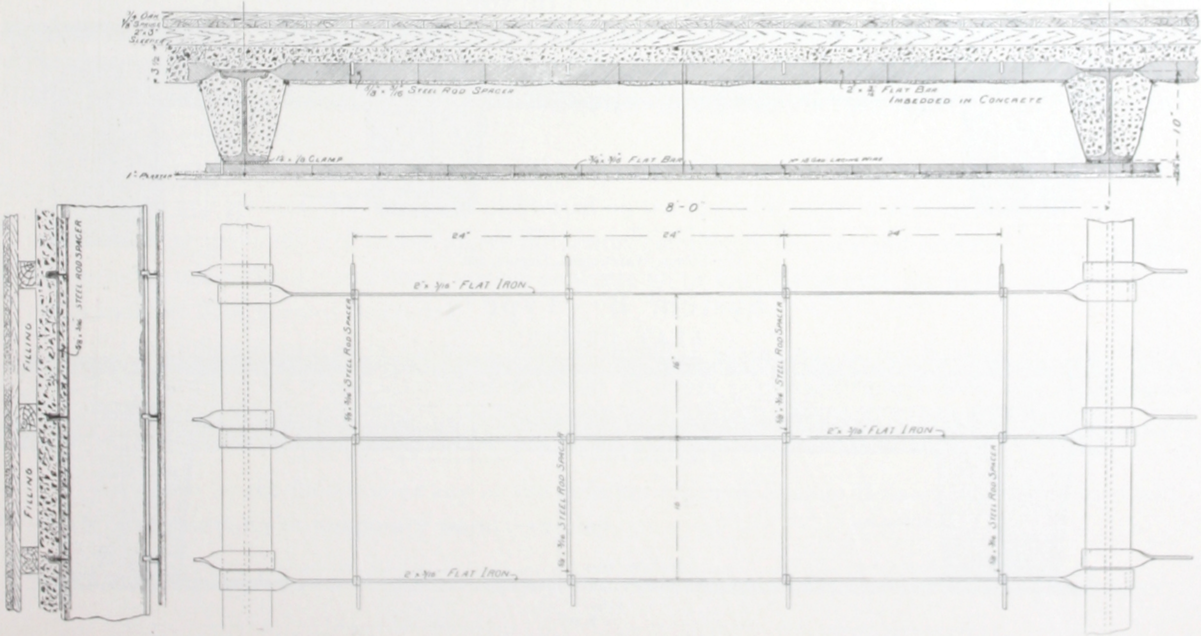


work on the same floors while the concrete is being laid, it is frequently more advantageous to use temporary wood centering instead of the wire centering.

This is shown by dotted lines in the illustrations. The wood centering protects the concrete from injury if walked over while it is green and also serves as a temporary floor before the concrete is laid.

With wood centering it is also practicable to place a cement or granolithic finish over the concrete before it has set, thus securing a perfect bond between the finished surface and concrete arch. Type 2 finishes with a paneled ceiling effect.

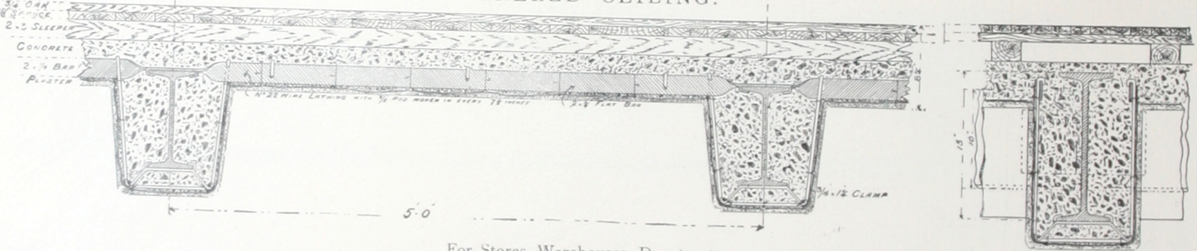
System B—Type 1.


7/8 Oak
7/8 Spruce
2"×3" Sleeper
3 1/2
5/8 × 3/16 Steel Rod Spacer
2 × 3/16 Flat Bar Imbedded in Concrete
10"
1 1/2 × 1/8 Clamp
3/4 × 3/16 Flat Bar
No 18 Gau Lacing Wire
1" Plaster
8'-0"
24"
24"
24"
2" × 3/16" Flat Iron
2" × 3/16" Flat Iron
2" × 3/16" Flat Iron
5/8 × 3/16" Steel Rod Spacer
5/8 × 3/16 Steel Rod Spacer
5/8 × 3/16 Steel Rod Spacer
5/8 × 3/16 Steel Rod Spacer
16"
16"
Filling
Filling
5/8 × 3/16 Steel Rod Spacer

For Public Buildings, Offices, Theaters, Churches, Schools, Hospitals, Hotels, Residences, etc.

System B—Type 2.

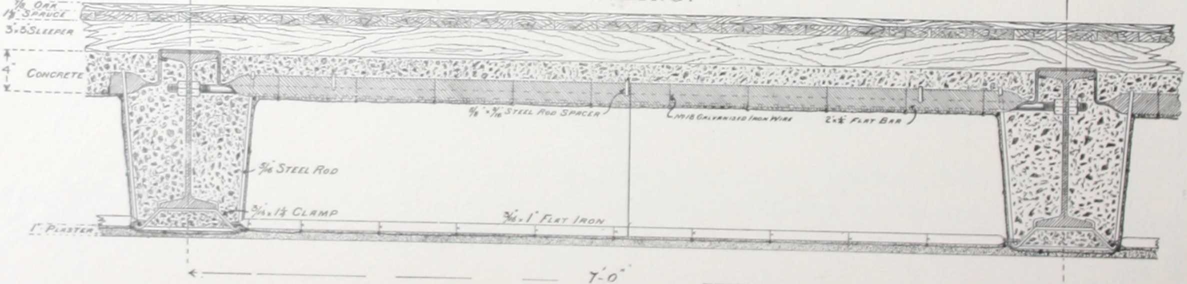
PANELED CEILING.



For Stores, Warehouses, Depots, etc.

System B—Type 3.

FLAT CEILING.



For Department Stores, Libraries, etc.

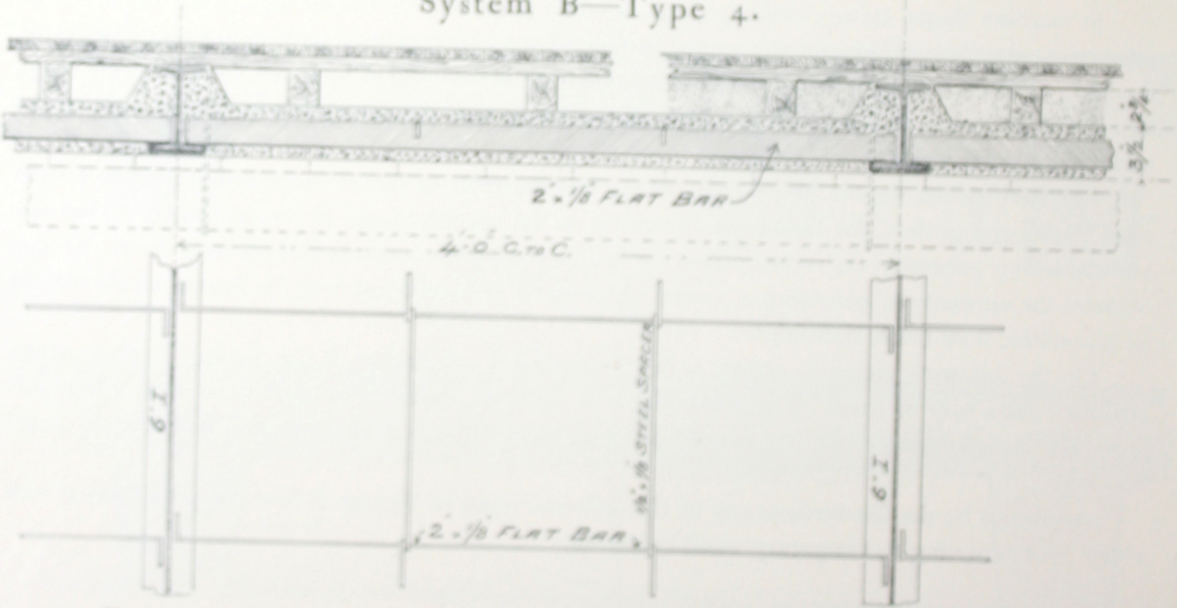
In machine shops, factory buildings, etc., where a fine finish for the ceilings is not required, the plastering may be omitted and the under surface of the concrete may be simply painted or whitewashed. The concrete surface after the wood centering is removed is, however, comparatively rough and if it is desired to approximate to a finished surface, a smooth coat of plaster should be specified under the plaster work.

For warehouses, depots, stores, etc., where it is desirable to secure increased protection for the steel beams and girders, the treatment illustrated on the opposite page is recommended. The concrete finishing generally 2½ inches above the beams completely encases and protects them. It also obviates the necessity of providing a special concrete fill or foundation over the beams where cement or granolithic floor finish is desired.

On the following pages is shown a very economical adaptation of the System B floor where shallow beams may be used. The total thickness of floors between finished floor and ceiling surfaces with 6-inch beams need not exceed 9 inches, including wood sleepers and with double wood flooring.

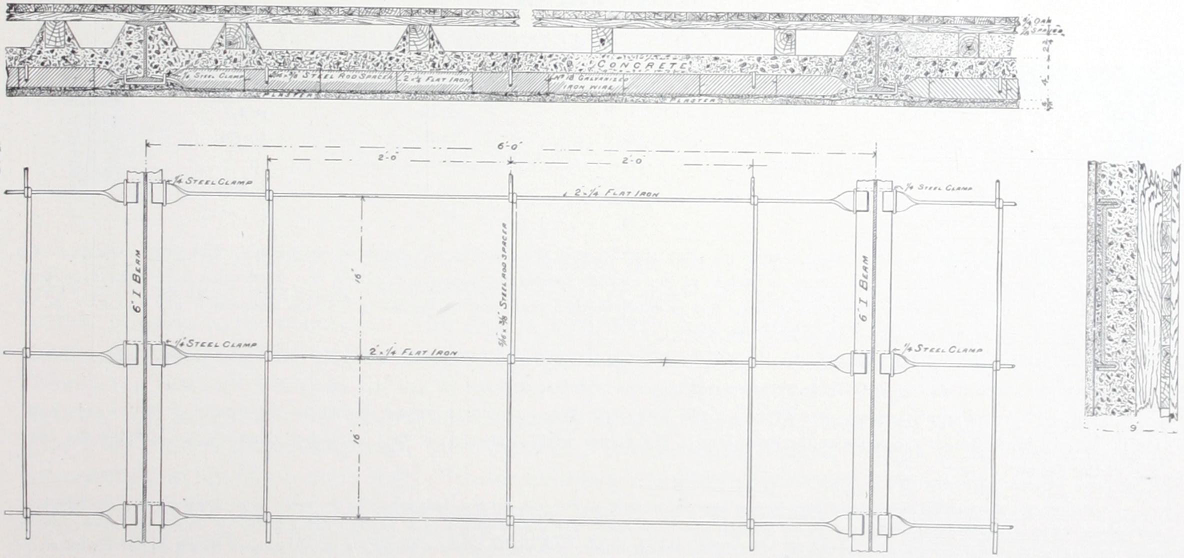
As shown by the illustrations any of the different types of System B floors may be erected with either wire centering or temporary wood centering.

System B—Type 4.



Illustrating details when wood centering (shown in dotted lines) is employed and when beams are spaced about 4 to 5 feet apart.

System B—Type 4.



For Hotels, Apartment Houses, Hospitals, Residences, Mezzanine Floors, etc.

System B.

TABLE OF WEIGHTS, SPACING OF BEAMS, ETC.

Type of construction.	Spacing of beams.	Depth of beams.	Thickness of concrete.	Weight per sq. ft. of concrete, imbedded iron and wire.	Weight of ceiling including plaster.	No. of coats of plaster required.
Type 1	8′ 0″	10″	3½″	30 lbs.	10 lbs.	3
“ 2	5′ 0″	10″	3½″	35 “	9 “	2
“ 3	5′ 0″	15″	3½″	50 “	10 “	3
“ 4	6′ 0″	6″	3½″	28 “	7 “	2

The weights per square foot of the concrete will vary slightly with the spacing and depth of the beams. The actual weights in any case may be determined readily by computing the weight of the concrete around the beams and girders and distributing it over the floor areas.

The weight of the beams and girders, of the wood or other finished floor, and of the filling between sleepers, if any,* must be added to the weights as given, for the total dead load of the floors.

Types 1 and 2, with suitable modifications, may be used in spans up to 12 feet; types 3 and 4, in spans up to 9 feet. The floor work can, however, be erected with greatest economy as to cost in spans of 8 feet or less.

"System B" requires no tie rods. For Types 1, 2 and 3, the floor beams should be framed so that the top flanges are at the same level; for Type 4, the lower flanges should be at the same level. The plaster work of ceilings, in Type 4, finishes about 1½ inches below the under side of the beams.

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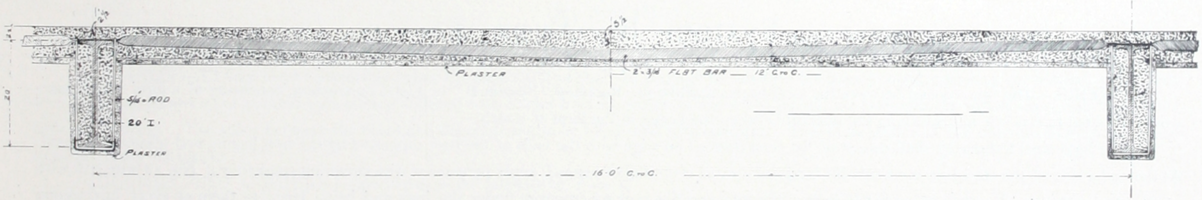
*The practice of employing sleepers, and filling between them in the usual manner with concrete, adds greatly to the weight of the floors, consumes valuable space and induces dry rot to a degree that renders the sleepers valueless after a few years. The under flooring may be laid and nailed directly on the concrete arches, resulting in an important economy and representing better practice. If a concrete filling is used, it should be light and porous. A mixture adapted for this purpose consists of one part of Portland cement, to ten parts of cinder, and weighs about 60 pounds to the cubic foot.

System B—Type 5.



This type of flooring is similar in every way to the other System B floors, except that the flat steel bars are bent or crooked downward 2 inches or more at the center of the span and imbedded in that position in the concrete. This type is particularly well adapted for floors of light capacity and where special conditions make it necessary to economize as much as possible in the structural steel. Where the distance between the steel members or supports is more than 9 or 10 feet, this form of flooring will be found more economical than any other. It may be employed to span directly from girder to girder, dispensing with the customary intermediate beams. Type 5 has been installed successfully in spans up to 22 feet. Under ordinary conditions, however, considering both the steel work and the fire-proofing the most economical results will be obtained when the girders are spaced 14 to 16 feet apart. The weight of the concrete and imbedded steel bars as shown in the illustration is 43 pounds per square foot; plaster (two coats), 7 pounds.

Specifications.

System B—Type 1.

(See page 27).

FLOORS.—The fire-proofing between the steel beams shall be the Roebling "System B" or Flat Construction, consisting of a light steel framework imbedded in concrete and spanning the interval between the beams in the form of a slab.

The light steel framework shall consist of flat steel bars set on edge with the ends of the bars supported by the iron beams and secured to them. At the under side of the steel bars erect suitable temporary wood centering or instead, apply permanent wire centering consisting of No. 22 wire lath with a solid steel stiffening rib woven in every 7½ inches, the stiffening ribs running crosswise under the bars and being laced to them at every intersection with No. 18 galvanized wire. On the centering so provided, fill cinder concrete, consisting of high-grade Portland cement, sharp sand and clean steam ashes, to a depth of not less than 3½ inches. All floor beams projecting above or below the concrete floor shall have the webs thoroughly protected by concrete.

The flooring to be subject to test at any points that may be designated by the architect. It shall in all cases develop a strength, in thirty days, equal to the capacity of the supporting ironwork.

CEILINGS.—The ceilings over the (——— ———) stories shall be flat. Flat steel ceiling bars set on edge, shall be supported transversely from the under side of the I beams by suitable iron clamps or hangers. Painted wire lathing, stiffened with a solid steel rib woven in every 7½ inches, shall be applied to the bars so that the ribs shall cross them at right angles. The ribs in the lathing to be securely laced to the supporting bars, at every intersection, with No. 18 galvanized wire. All wire ceilings to be finished ready for plaster.

COLUMNS.—All free columns are to be encased by painted wire lathing, stiffened with a solid steel rib woven in every 7½ inches. Suitable light steel furring shall be provided, so as to offset the lathing from the column, and finish round or square, as shown on the plans.

GIRDERS.—All girders projecting through the ceilings shall be encased by painted wire lathing, stiffened with a solid steel rib woven in every 7½ inches. The lathing to be rigidly supported by suitable light steel furring, built out so as to offset the wire from the girder.

System B—Type 2.

(See page 28).

FLOORS.—Specification the same as for Type 1.

CEILINGS.—All floor beams projecting below the concrete floor shall be incased by suitable temporary wood centering or, instead, permanent wire centering consisting of painted wire lathing stiffened with a solid steel rib woven in every 7½ inches, the lathing to be rigidly supported by suitable light steel furring. The space between the beam and the centering to be filled solid with concrete. The under surface of the concrete flooring and beams to be left ready for plaster.

COLUMNS AND GIRDERS.—Specifications the same as for Type 1.

System B—Type 3.

(See page 28).

FLOORS.—Specification the same as for Type 1.

CEILINGS.—The floor beams projecting below the concrete floor shall be incased by suitable temporary wood centering or, instead, permanent wire centering consisting of painted wire lathing stiffened with a solid steel rib woven in every 7½ inches, the lathing to be rigidly supported by light steel furring, so as to offset the wire from the beam. The space between the girder and centering to be filled solid with concrete. Provide and set in position the flat steel bars for the flat ceiling construction Painted wire lathing, stiffened with a solid steel rib woven in every 7½ inches, shall be applied to the under side of the flat steel bars, with the ribs crossing them at right angles. The ribs in the lathing to be securely laced to the bars, at every intersection, with No. 18 galvanized wire. All ceilings to be finished ready for plaster.

COLUMNS AND GIRDERS.—Specifications the same as for Type 1.

System B—Type 4.

(See pages 28 b and 29).

FLOORS.—Specification the same as for Type 1.

CEILINGS.—The under side of the concrete shall provide a continuous plastering surface for flat ceilings, below the under side of the floor beams.

COLUMNS AND GIRDERS.—Specifications the same as for Type 1.

System B—Type 5.

(See page 30 a).

FLOORS.—Specification the same as "System B—Type 1" (page 31) except that the thickness of the concrete slab be made 5½ inches instead of 3½ inches.

CEILINGS.—Specification the same as for Type 2.

COLUMNS AND GIRDERS.—Specifications the same as for Type 1.

NOTES.

1.—When wood centering is employed in erecting Types 2, 4, and 5 and a first-class plaster finish is desired, two coats (a brown coat and a finishing coat) averaging not less than ⅝ to ¾ of an inch in thickness should be specified under the plaster work If the brown coat in contact with the concrete is less than ⅝ of an inch in thickness the plaster is liable to become discolored.

2.—In cases when the floor beams are more than 8 feet apart and it is desired to lay a cement or granolithic finish on the concrete floor, if temporary wood centering is employed the centers should be "eased" so as to allow the concrete floor to deflect to its permanent position, before the finished surface is laid.

3.—Wood centering can not be used with economy in any of the System A floors.

Suspended Ceilings.

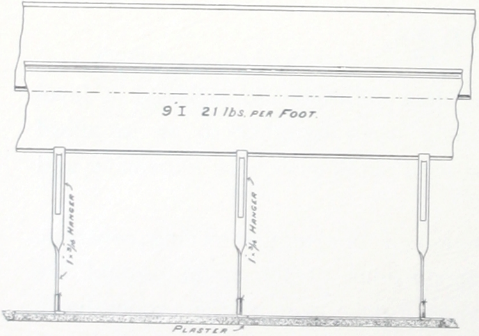
UNDER roofs, and over hallways, closets, etc., it is often desirable to suspend a level ceiling. The usual practice of bolting tee and angle irons together so as to afford supports every 12 or 16 inches for tile slabs or wire lathing is very expensive and often unnecessarily heavy.

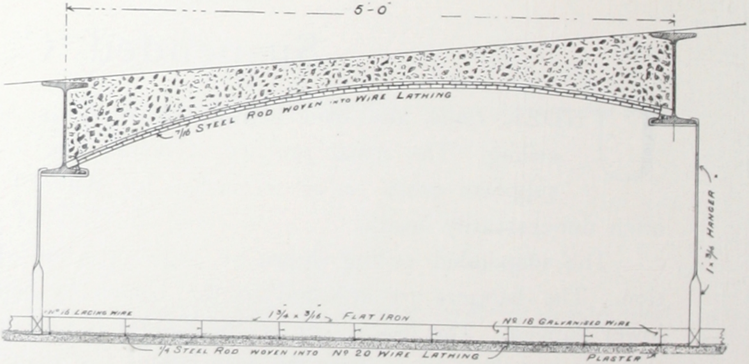
The suspended ceiling shown on page 34 is an adaptation of our regular ceiling construction. The hangers are attached to the beams by bending portions of the metal around the lower flanges. The lower part of the hanger is bent so as to form a seat at the proper level, and flat iron bars to support the wire lathing are then set on edge and laced firmly in position. Weight, including plaster, 10 to 12 pounds per square foot, depending upon the length of hangers.

A modification of this ceiling applicable to brick arches is also shown.

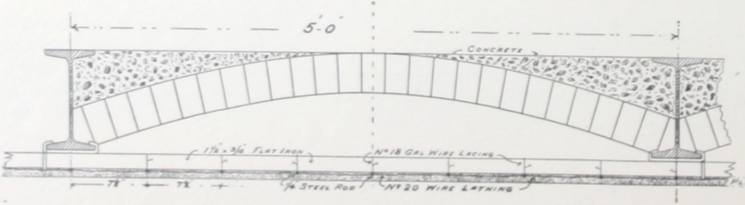
SPECIFICATION.—Provide suitable clamps or hangers and attach these, at intervals of 16 inches, to the lower flange of the I beams. The clamps or hangers to be provided with a seat, at the proper level, to receive flat iron bars set on edge; these bars to be laced rigidly in position with No. 16 galvanized lacing wire, and to be capable of supporting a uniformly distributed load of 10 pounds per square foot, without appreciable deflection. Painted wire lath, stiffened with a ¼-inch solid steel rib woven in every 7½ inches, shall be applied to the under side of these bars with No. 18 galvanized lacing wire; the ribs to cross the bars at right angles and to be laced at every intersection. The ceiling to be left ready for plaster.

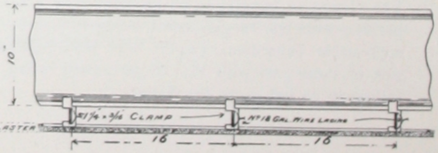
Suspended Ceiling.





Flat Ceiling Construction for Brick or other Segmental Arches.





Partitions.

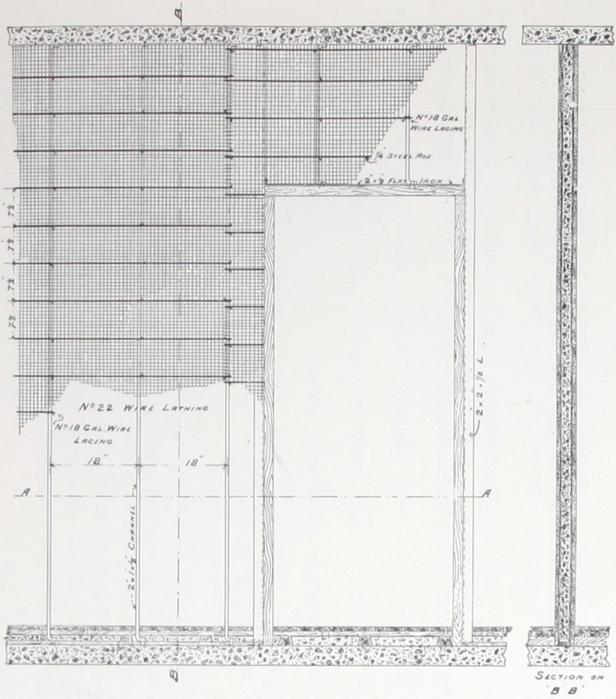
THE ROEBLING partitions have met with great favor. They are strong, transmit very little sound, are vermin-proof, light, and, being constructed of incombustible material, they offer great resistance to fire. The principal advantage of these partitions over the ordinary hollow tile or "block" partitions is due to the monolithic construction. The absence of joints secures increased strength and elasticity, and prevents cracks in the plaster. The wire partitions also provide conduits for piping, speaking tubes, electric wires, etc., which can only be secured in the tile partitions by gouging out recesses, thereby mutilating the partition and seriously impairing its strength. Other advantages of wire partitions are that they do not discolor plaster and that they occupy less space than a tile partition of equal strength. The Roebling Wire Lathing, with the solid steel stiffening rib *woven in*, is used exclusively in all this work. The stiffening rib has sufficient body, or mass, to insure permanence and, being laced to the stud with galvanized wire, the construction is exceedingly durable.

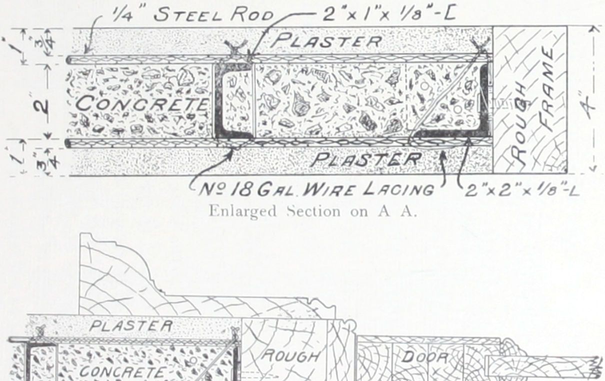
The partitions shown are also adapted for elevator enclosures, vent shafts, pipe covering, etc.

A solid fire-proof partition finishing 4 inches thick when plastered, is shown on page 37. It has a core, 2½ inches thick, of cinder concrete, both surfaces of which are plastered in the usual manner. As the concrete will receive nails, no wood furring is necessary in order to attach the base-board, chair-rail or picture moulding. Convenient vertical spaces for piping, speaking tubes and electric wires, can readily be provided in this partition. The size of the door frames and the usual arrangement of the wood trim are shown on an enlarged scale. Only two coats of plaster—a "brown" coat and a "finishing" coat—are required to finish this partition. Weight, including plaster, 32 pounds per square foot.

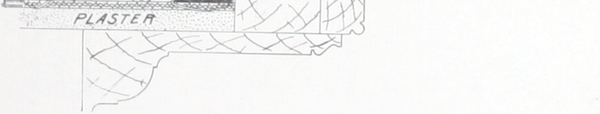
SPECIFICATION.—The studs shall consist of 2 x 1 x ⅛-inch channels, spaced 18 inches center to center, and securely fastened at the top and bottom. (Rough wood frames for all openings will be furnished and set in position under the carpenter's contract.) 2 x 2 x ⅛-inch angle irons, or 2 x 1 x ⅛-inch channels, shall be secured to the vertical sides of all door frames and extend from floor to ceiling. After all the light iron work and wood frames are in position, painted wire lathing, stiffened with a ¼-inch solid steel rib, woven in every 7½ inches, shall be laced to both sides of the studs, with No. 18 galvanized wire; the stiffening ribs running crosswise over the studs. The space between the wire lathing surfaces shall be filled solid with cinder concrete consisting of 1 part high-grade Portland cement, 2½ parts sand and 6 parts steam ashes, imbedding the channels and forming a solid concrete slab about 2½ inches in thickness.

All surfaces to be left ready for plaster.





Enlarged Section on A A.

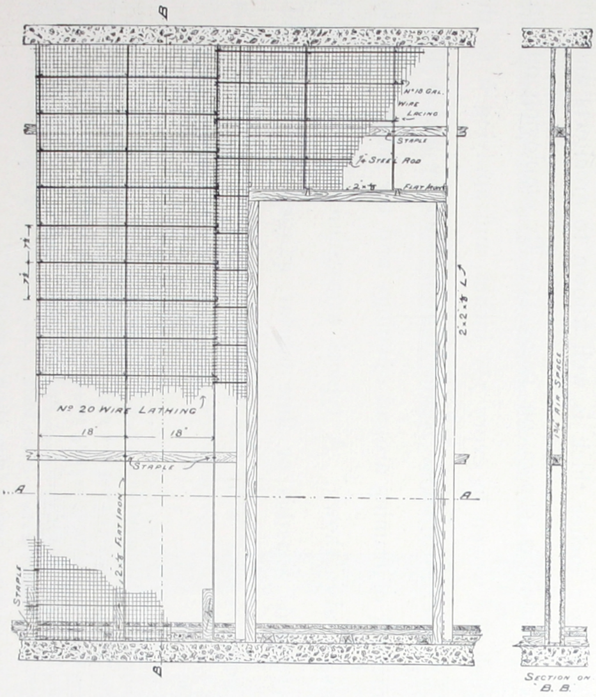


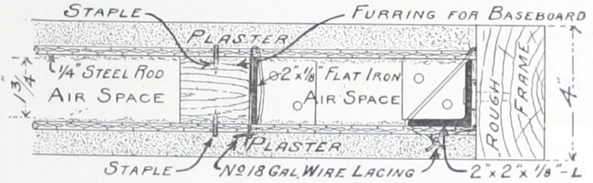
Typical Section of Wood Trim.

A hollow partition finishing 4 inches thick when plastered, is illustrated on the opposite page. This partition is lighter than the solid partition shown on the preceding page. It has an air space of about 1¾ inches between the plastered surfaces, which makes a convenient conduit for piping, tubing and electric wires. The method of attaching wood furrings by staples for the base-board, chair-rail and picture moulding, is also shown. Three coats of plaster—a "scratch" coat, a "brown" coat, and a "finishing" coat—are necessary to finish each side. "Hard" plasters or lime mortar, gauged with plaster of Paris, should in all cases be used in plastering this partition, in order to secure the best results. Weight, including plaster, 22 pounds per square foot.

SPECIFICATION.—The studs shall consist of 2 x ⅛-inch flat iron or soft steel, spaced 18 inches center to center and securely fastened at the top or bottom. (Rough wood frames for all openings and all necessary furring for base board, chair-rail and picture moulding, will be furnished and set in position under the carpenter's contract). 2 x 2 x ⅛-inch angle irons, or 2 x 1 x ⅛-inch channels shall be secured to the vertical sides of all wood door frames and extend from floor to ceiling. After all the light iron work, wood frames for openings and furrings are in position, painted wire lathing, stiffened with a ¼-inch solid steel rib, woven in at intervals of 7½ inches, shall be laced to both sides of the studs with No. 18 galvanized wire; the stiffening ribs running crosswise over the studs.

All surfaces to be left ready for plaster.

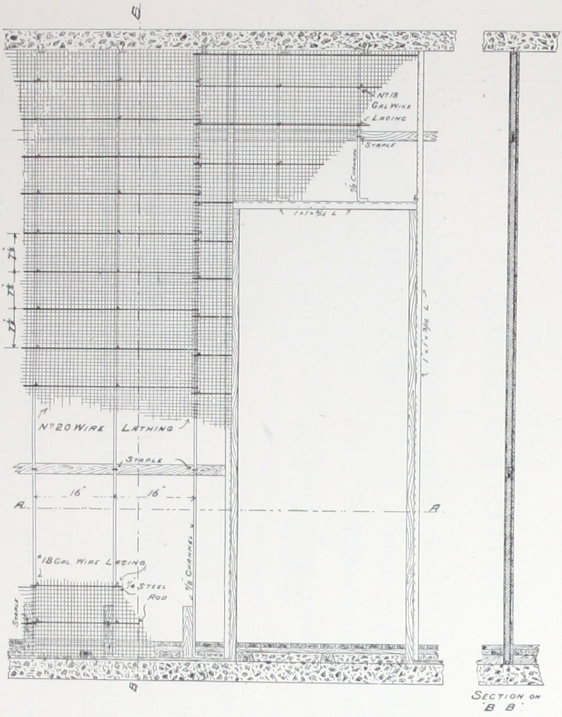


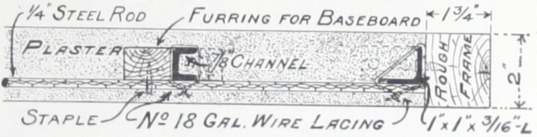


Enlarged Section on A A.

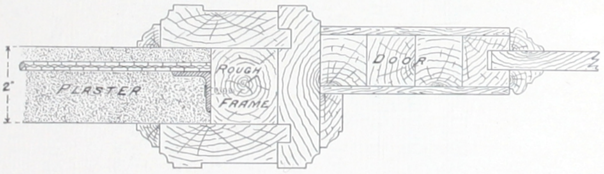
The solid plaster partition finishing 2 inches thick is well known to architects and builders. Our method of constructing this partition is shown on page 41. By employing our stiffened wire lathing with ¼-inch solid steel ribs, woven in every 7½ inches, and applying it so that the ribs cross the studs at right angles, the partition is rigidly braced laterally and a firm surface for plastering is secured. The method of framing around openings and the manner of attaching the rough wood frames by screws, is also shown. A typical arrangement of the wood trim is indicated in an enlarged scale. "Hard" plasters or lime mortar, gauged with plaster of Paris, are essential in order to insure good results with this partition. Weight, including plaster, 20 pounds per square foot.

SPECIFICATION.—The studs shall consist of ⅞-inch channels or 1 x $\frac{3}{16}$-inch flat iron, spaced 16 inches center to center, and securely fastened at the top and bottom. All openings to be framed with 1 x 1 x $\frac{3}{16}$ inch angle iron or ⅞-inch channels; the vertical members at door openings to extend from floor to ceiling. All angle iron framing to be suitably punched to permit the fastening of wood-work. When all the light iron-work is in position, painted wire lathing stiffened with a ¼-inch solid steel rib, woven in every 7½ inches, is to be laced to one side with No. 18 galvanized wire; the stiffening ribs running crosswise over the studs. (All necessary wood furrings for base-board, chair-rail and picture moulding to be set in position under the carpenter's contract before plaster is applied).





Enlarged Section on A A.



Typical Section of Wood Trim.

Furring and Wire Lathing.

A SUITABLE foundation for ornamental plaster effects is generally obtained by light iron furring and wire lathing. The furring usually consists of brackets or profile pieces made from flat or half oval iron, bent to correct outline, and is secured in position by means of clamps or clips to the structural iron or by nailing or stapling to the concrete fire-proofing.

On the opposite page are shown standard methods of erecting work of this character.

Figure 1 illustrates the adaptability of our methods to electric wiring. There is generally ample room between the wire lathing and the fire-proofing for the cables. The square board shown is entirely concealed by the plaster and makes a suitable furring for attaching the lamp socket.

Figure 2 shows a light construction used in the corridor of the Bowling Green Building, Nos. 5–11 Broadway, New York City, for supporting papier mache.

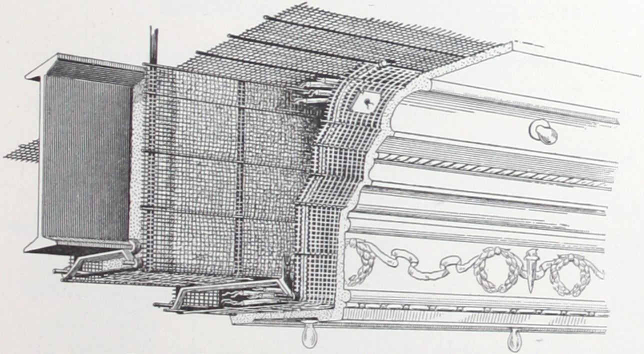


Fig. 1.—Furring for ornamental effects in Plaster.

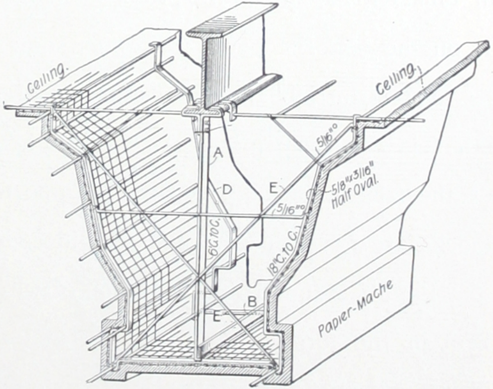


Fig. 2.—Furring for Foundation for Papier Maché.

The massive effects in the interior of the Broad Street Station of the Pennsylvania Railroad in Philadelphia, Pa., were produced entirely by our system of furring and wire lathing. Figure 1, on the opposite page, illustrates some details of this work.

When furring and wire lathing is erected in connection with the hollow tile fire-proofing the brackets or profile pieces are so designed and adjusted that the greater portion of the weight of the false work and plaster is supported by the structural iron. By our methods, the tile blocks are never injured and a rigid construction is secured.

Figure 2 shows an adaptation of wire lathing for exterior wall furring. Heavy sheet iron is bent in the form of a V rib and *woven in* the wire lathing at intervals of every 7½ inches. This furring is readily attached to the wall by nails driven through the angle of the rib into the mortar joints. The angle of the rib offsets the wire surface an inch from the wall and, when plastered, leaves an air space of ¾ of an inch between the plaster and the wall.

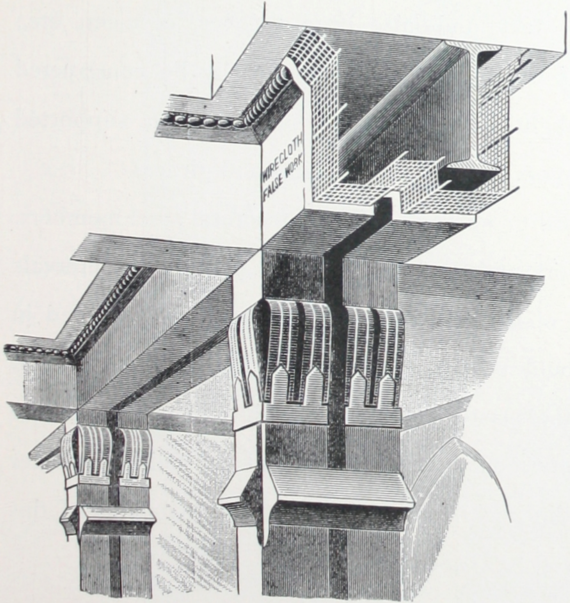


Fig. 1.—False work for massive effects in Plaster.

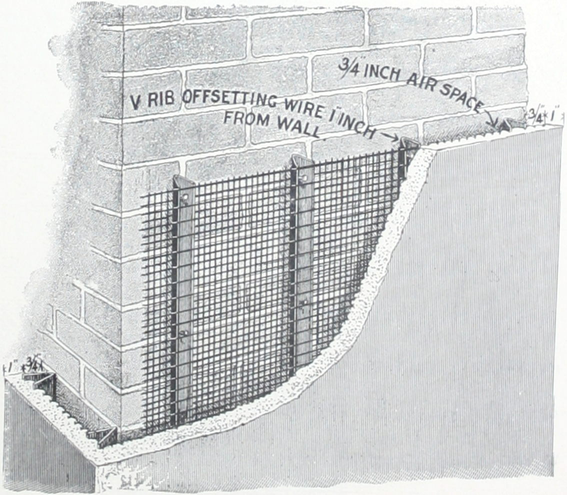
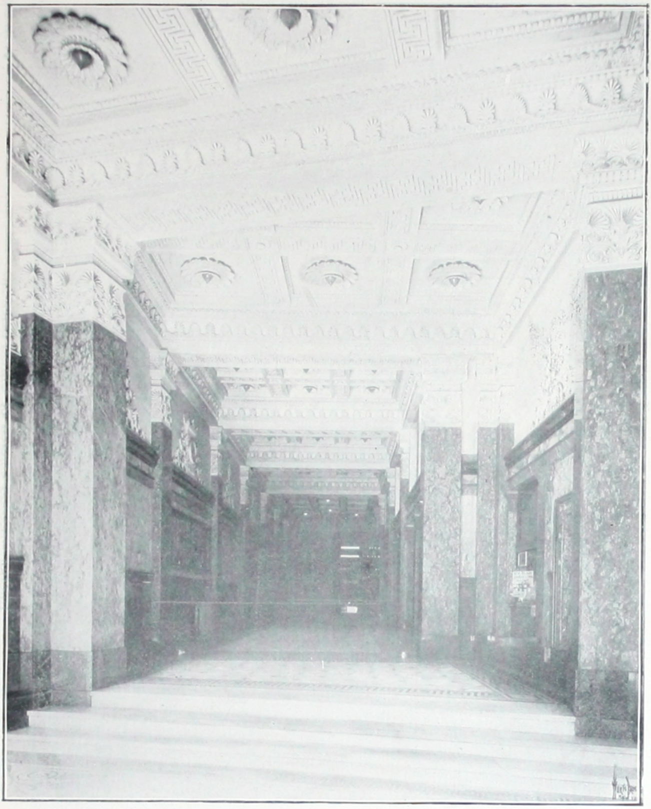


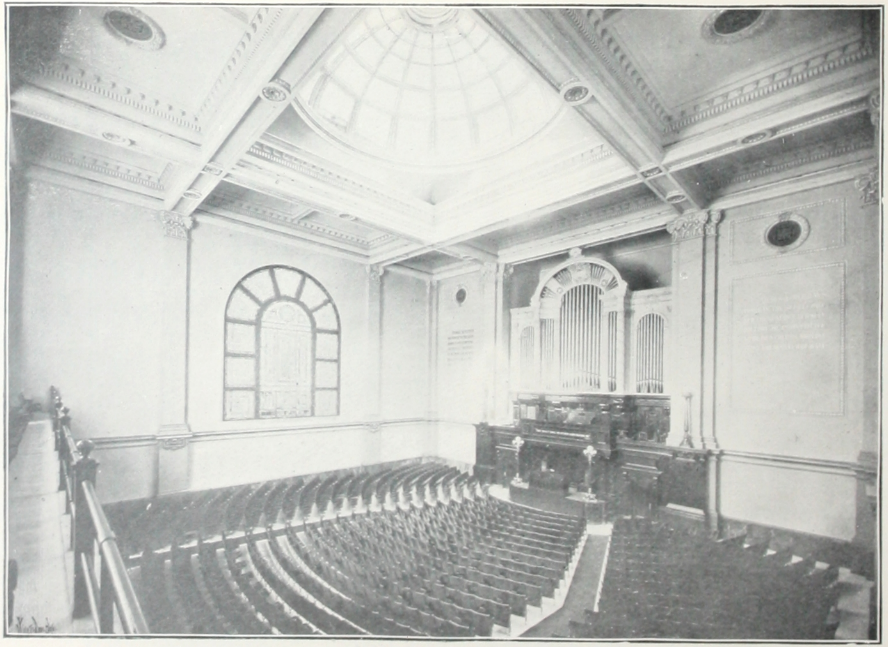
Fig. 2.—Exterior Wall Wire Furring.

Arches, domes and alcoves, up to spans of 12 feet, and false beams, coves, cornices, etc., for ornamental effects in vestibules and hallways can readily and economically be constructed by our system of furring and wire lathing. The light steel furring, in such cases, is supported directly by the walls or by means of clamps and hangers from the floor beams and girders

For large ceilings consisting of cylindrical, spherical or warped surfaces, structural steel members, of sufficient strength to carry the light steel false work and plaster, should be provided at intervals of 4 to 6 feet. These structural members (usually of tee or angle section), should be included in the specifications for the structural steel, and should be curved or bent to correct outlines and erected 2 inches back of the surfaces at which the plaster work will finish. This will provide suitable space for the plaster and the necessary intermediate furring, so that the finished plaster surface will conform accurately to the desired outline. An illustration of the possibilities of this form of construction is shown on pages 46a, 46b, 47, 48, 48a, 48b and 49.

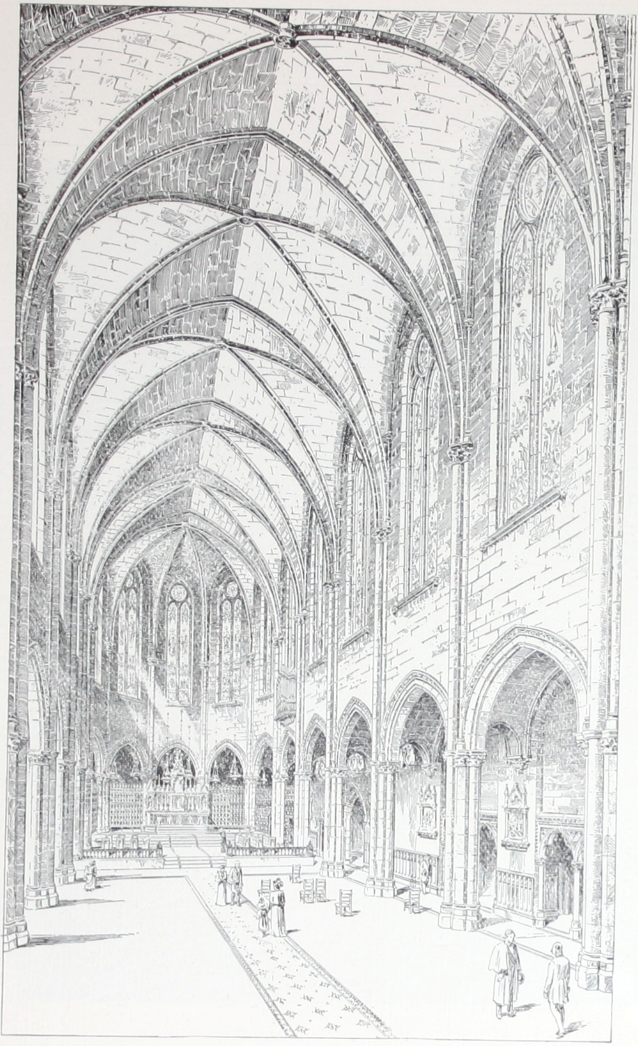


Entrance Hall, Bowling Green Offices, W. & G. Audsley, Architects.
5–11 Broadway, New York.
Illustrating ornamental effects by the Roebling method of furring and wire lathing.



Interior—Second Church of Christ, Scientist.
68th Street and Central Park, West, New York.
Illustrating ornamental effects by the Roebling method of furring and wire lathing.

F. R. Comstock, Architect.

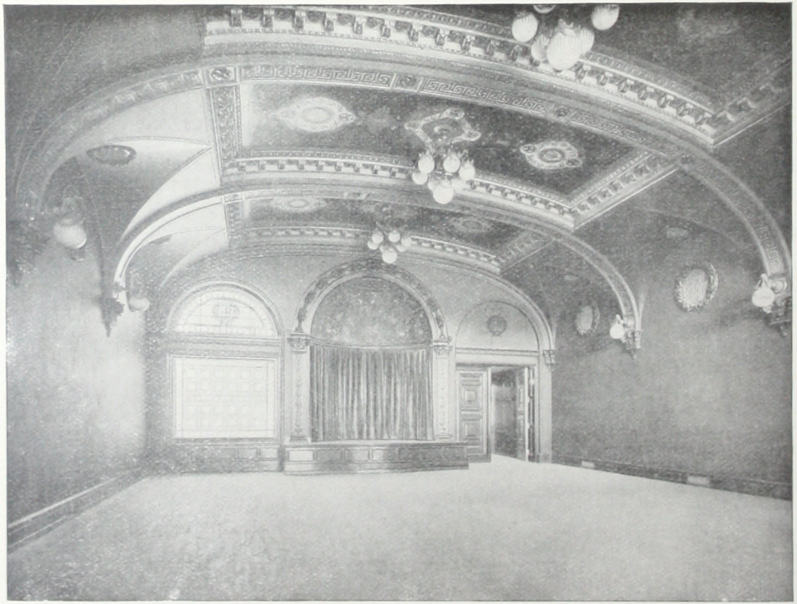


N. Le Brun & Son, Architects.

CHURCH OF ST. MARY THE VIRGIN,

46th St., near 6th Ave., New York.

The complex elliptical groined arches in the ceiling were produced by the Roebling System of furring and wire lathing.

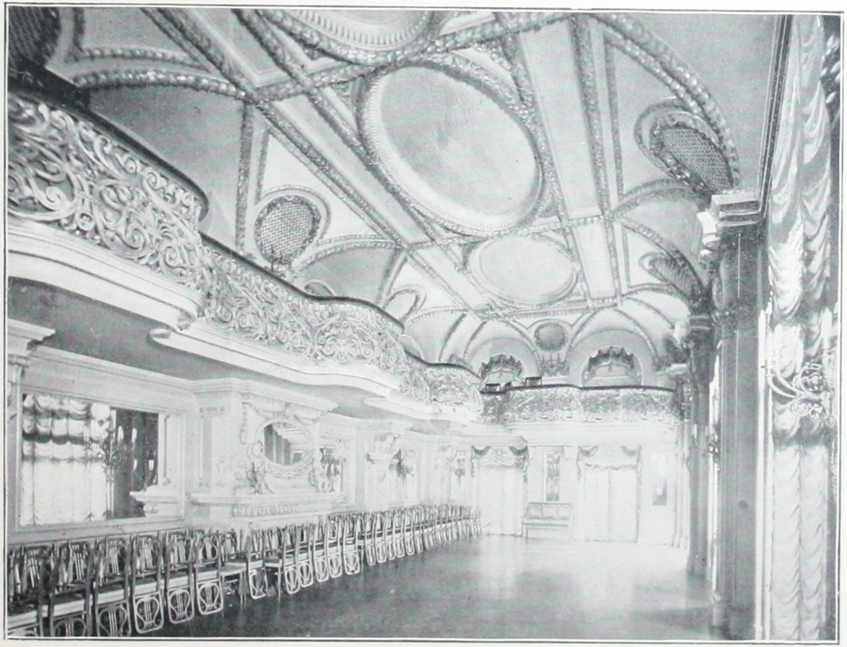


CEILING OF AUDITORIUM,

American Baptist Publication Society's Building, Philadelphia, Pa.

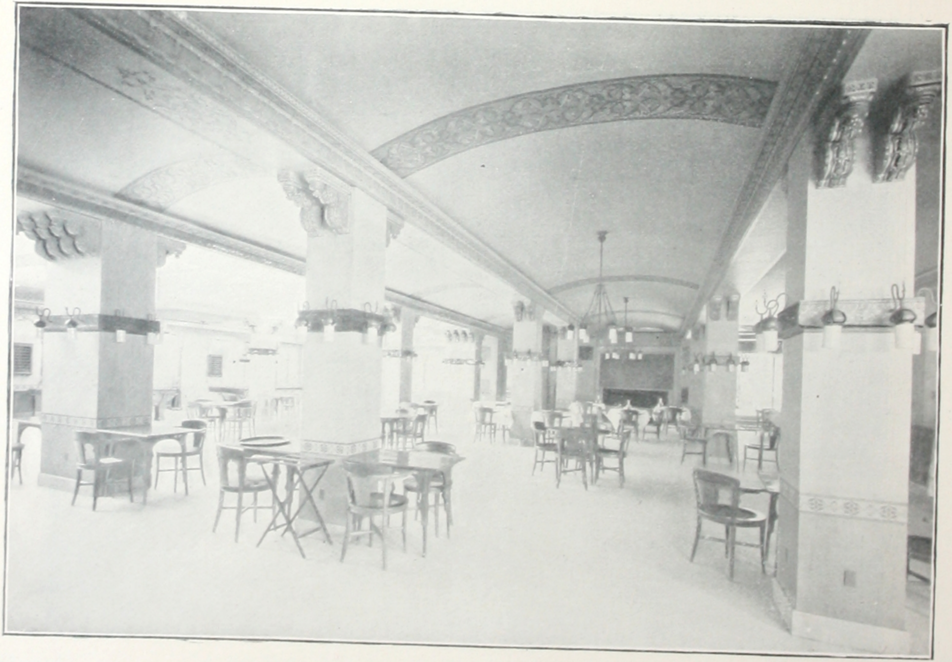
Illustrating ornamental effects by the Roebling method of furring and wire lathing.

Frank Miles Day & Bro., Architects.



Ball Room, Hotel Flanders, 15th & Walnut Streets, Philadelpia. Seymour Davis, Architect.

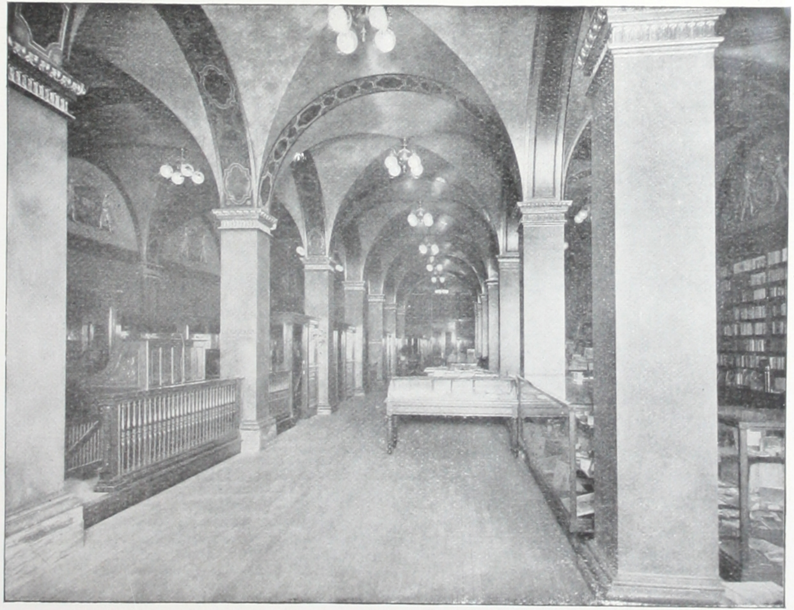
Illustrating ornamental effects by Roebling method of furring and wire lathing.



Café, Hotel Lorraine, 45th Street and 5th Ave. New York.

J. O'Rourke & Sons, Architects.

Illustrating ornamental effects by the Roebling System of furring and wire lathing.



MAIN CORRIDOR, GROUND FLOOR,

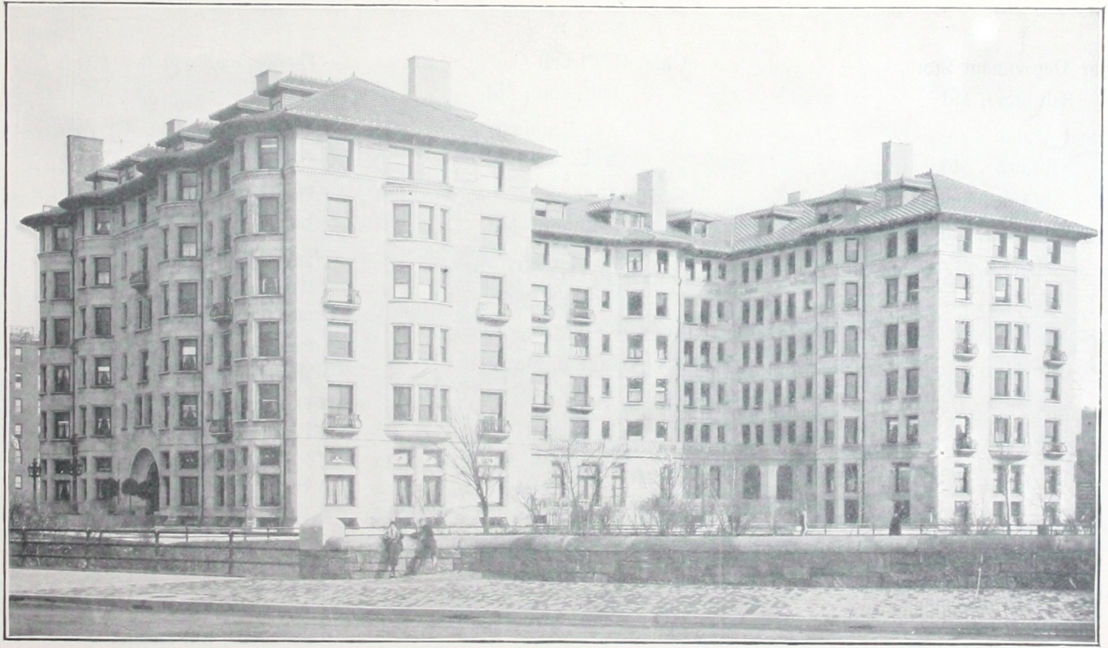
American Baptist Publication Society's Building, Philadelphia, Pa.

Illustrating groined ceiling and other novel effects by the Roebling method of furring and wire lathing.

Frank Miles Day & Bro., Architects.

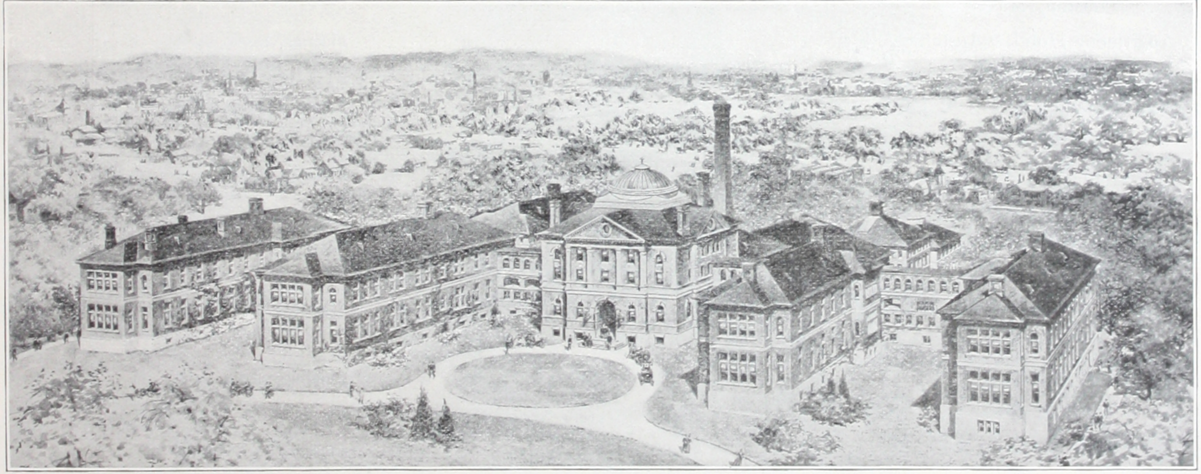
Representative fire-proof buildings in which the Roebling System of Fire-proof Construction has been installed.

BUILDINGS.	ARCHITECTS.	CHARACTER OF THE FIRE-PROOFING WORK.
The Albany Hospital Buildings, Albany, N. Y.	A. W. Fuller, Albany, N. Y.	Flooring, 43,000 sq. ft. Partitions, 105,000 sq. ft. Wire wall furring, 47,000 sq. ft.
Hotel Savoy, Boston, Mass.	Samuel Dudley Kelly, Boston, Mass.	Flooring, 45,000 sq. ft. Partitions, 90,000 sq. ft.
Hotel Colonial, Boston, Mass.	A. H. Vinal, Boston, Mass.	Flooring, 20,000 sq. ft. Partitions, 135,000 sq. ft.
Apartment Hotel "Westgate," Boston, Mass.	A. H. Vinal, Boston, Mass.	Flooring, 15,000 sq. ft.



Hotel Somerset, Commonwealth Ave., Boston, Mass.
A. W. Bowditch, Architect.
Roebling fire-proof floors, partitions, furring and wire lathing throughout.

Posner Department Store, Baltimore, Md	Chas. E. Cassell, Baltimore, Md.	Flooring, 109,600 sq. ft.
National Union Bank, Baltimore, Md.	Baldwin & Pennington, Baltimore, Md	Flooring, 10,300 sq. ft. Partitions, 1500 sq. ft.
Mt. Royal Apartment House, Baltimore, Md.	E. H. Glidden, Baltimore, Md.	Flooring, 75,000 sq. ft. Partitions, 83,500 sq. ft.
Calvert School, Baltimore, Md.	Wyatt & Nolting, Baltimore, Md.	Flooring, 14,900 sq. ft. Wire wall furring.
Beacon Chambers, Cor. Myrtle & Joy Sts., Boston, Mass.	Herbert D. Hale, Boston, Mass.	Flooring, 56,600 sq. ft. Partitions, 72,000 sq. ft. Wire wall furring.
Hotel Somerset, Boston, Mass.	A. W. Bowditch, Boston, Mass.	Flooring, 129,000 sq. ft. Partitions, 166,000 sq. ft. Wire wall furring. Furring and Wire Lathing.
Lowney Building, 445 Commercial St., Boston, Mass.	Dean & Main, Boston, Mass.	Flooring, 5500 sq. ft.
Relief & Ambulance Station, City Hospital, Haymarket Square, Boston, Mass.	Kendall, Taylor & Stevens, Boston, Mass.	Flooring, 28,500 sq. ft. Partitions, 22,600 sq. ft. Furring and Wire Lathing.

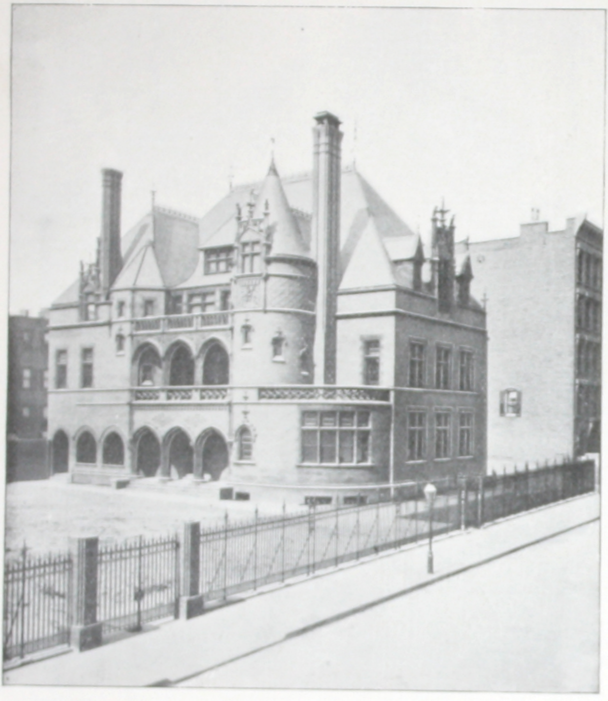


The Albany Hospital, Albany, N. Y.

A. W. Fuller, Architect.

Roebling fire-proof floors, partitions and wire wall furring.

Apartment Hotel "Belvoir," Boston, Mass.	A. H. Vinal, Boston, Mass.	Flooring, 25,000 sq. ft.
Apartment Hotel "Austerfield," Boston, Mass.	A. F. Smith, Boston, Mass.	Flooring, 20,000 sq. ft.
State St. Block (U. S. Bonded Warehouse), Boston, Mass.	Willard T. Sears, Boston, Mass.	Flooring, 30,000 sq. ft.
Store and Tenement Building, Boston, Mass.	Samuel Dudley Kelly, Boston, Mass.	Flooring, 15,000 sq. ft.
Bachelor Apartments, Boston, Mass.	A. H. Vinal, Boston, Mass.	Flooring, 10,000 sq. ft.
Monadnock Apartments and Store, Boston, Mass.	Dwight & Chandler, Boston, Mass.	Flooring, 25,000 sq. ft.
Ferdinand Building, Boston, Mass.	John Lyman Faxon, Boston, Mass.	Flooring, 30,000 sq. ft.
Store and Tenement Building, Boston, Mass.	G. Currier (Owner), Boston, Mass.	Flooring, 15,000 sq. ft.
Apartment House "Colonial," Buffalo, N. Y.	Boughton & Johnson, Buffalo, N. Y.	Flooring, 45,000 sq. ft.

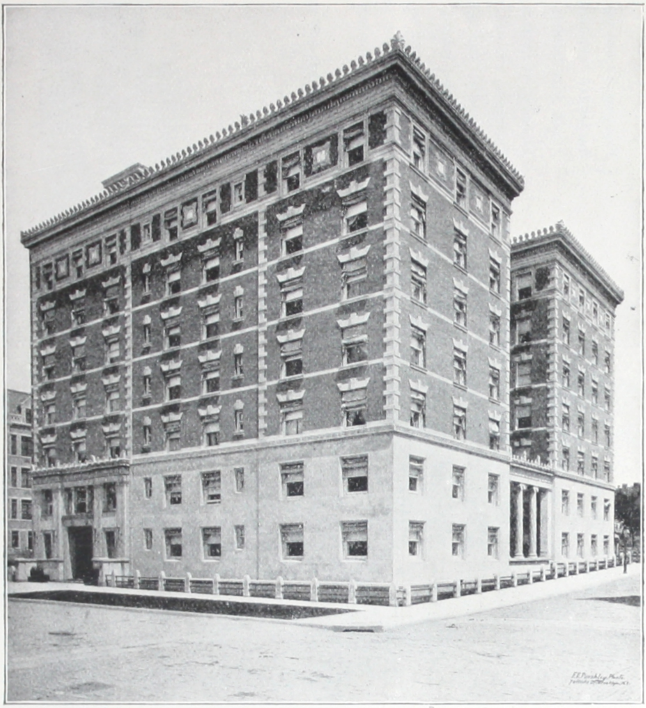


St. Christopher's Home, East 88th St., New York.

Barney & Chapman, Architects.

Roebling fire-proof floors throughout.

Apartment House "Wellesley," Buffalo, N. Y.	Kimball & Dixon, Buffalo, N. Y.	Flooring, 14,000 sq. ft. Partitions, 19,000 sq. ft.
Apartment House, Buffalo, N. Y.	Cyrus K. Porter & Son, Buffalo, N. Y.	Flooring, 9,500 sq. ft. Partitions, 9,000 sq. ft.
Jamaica Savings Bank Building, Jamaica, L. I.	Hough & Duell, New York.	Flooring, 12,000 sq. ft. Partitions, 11,300 sq. ft.
Newark Gas Company's Building, Newark, N. J.	H. J. Hardenbergh, New York.	Flooring, 16,000 sq. ft. Ornamental furring and wire lathing.
Hoe Building, New York.	Barney & Chapman, New York.	Flooring, 38,800 sq. ft.
Y. M. C. A. Building, New York.	Barney & Chapman, New York.	Roofing, 4,400 sq. ft.
Apartment Hotel "La Rochelle," New York.	Lamb & Rich, New York.	Flooring, 101,000 sq. ft. Partitions, 141,000 sq. ft. Ornamental furring and wire lathing.
Apartment Hotel "The Wellesley," New York.	Little & O'Connor, New York.	Flooring, 75,600 sq. ft. Partitions, 82,800 sq. ft.

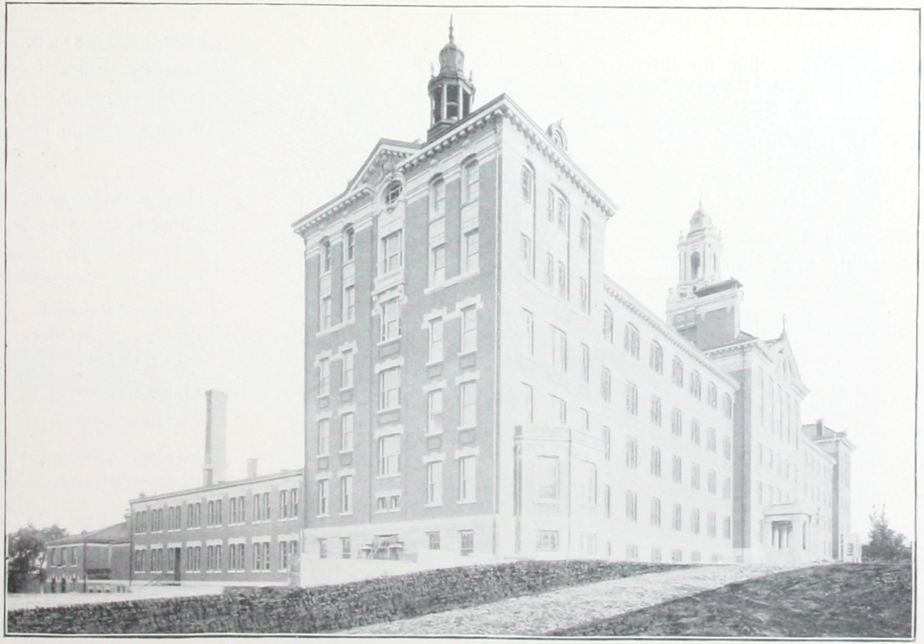


Apartment Hotel "The Wellesley," 81st St. and West End Ave., New York.

Little & O'Connor, Architects.

Roebling fire-proof floors and partitions throughout.

St. Christopher's Home, New York.	Barney & Chapman, New York.	Flooring, 12,000 sq. ft. Suspended ceilings, ornamental furring and wire lathing.
Bowling Green Offices, New York.	W. & G. Audsley, New York.	Flooring, 362,000 sq. ft. Partitions, 222,500 sq. ft. Suspended ceilings, ornamental furring and wire lathing.
New Hotel Renaissance, New York.	Howard & Cauldwell, New York.	Flooring, 30,602 sq. ft. Partitions, 22,500 sq. ft. Ornamental furring and wire lathing.
The Borgfeldt Building, New York.	Alfred Zucker, New York.	Flooring, 131,000 sq. ft.
Warehouse, 45–49 Bleecker St., New York.	Ralph S. Townsend, New York.	Flooring, 39,300 sq. ft.
Polhemus Memorial Clinic, Brooklyn, New York.	Marshall L. Emery, New York.	Flooring, 34,300 sq. ft. Partitions, 39,300 sq. ft. Ornamental furring and wire lathing.
Grammar School No. 75, New York.	C. B. J. Snyder, New York.	Flooring, 4,429 sq. ft.

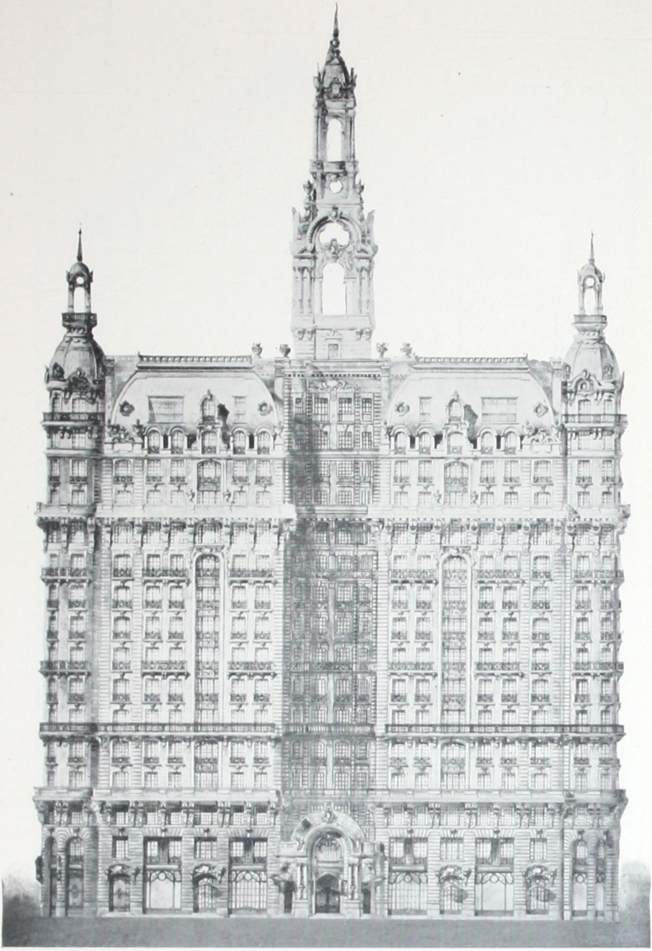


Roman Catholic Orphan Asylum, Sedgwick Ave. and Kingsbridge Road, New York.

Schickel & Ditmars, Architects.

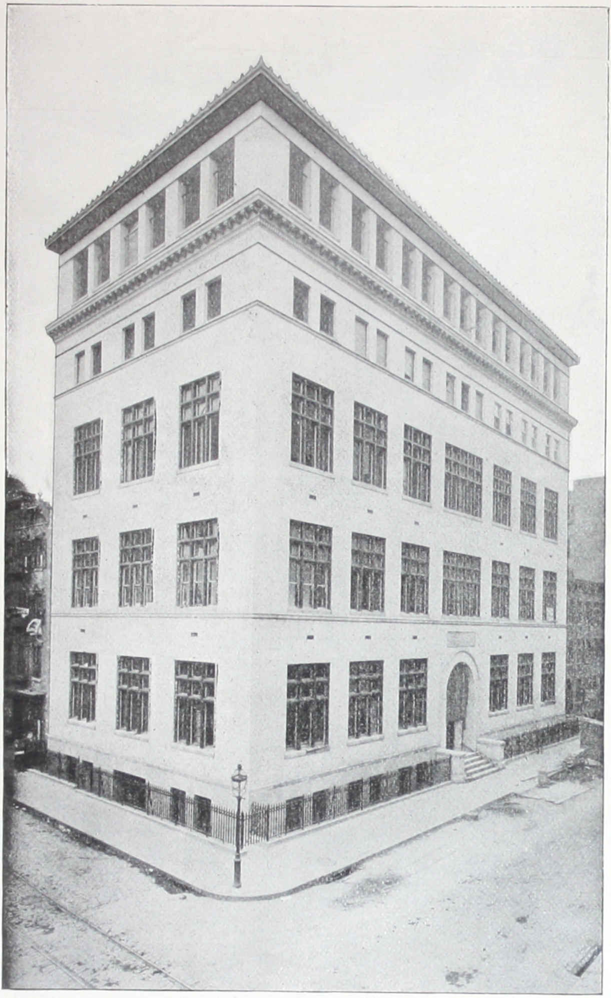
Roebling fire-proof floors, furring, and wire-lathing throughout.

Roman Catholic Orphan Asylum for Boys, Fordham Heights, New York.	Schickel & Ditmars, New York.	Flooring, 210,900 sq. ft. Suspended ceilings. Ornamental furring.
Residence of O. G. Jennings, New York.	Earnest Flagg, New York.	Flooring, 11,600 sq. ft.
The Lorraine, 45th St. & 5th Ave., New York.	J. O'Rourke & Son,	Flooring, 163,200 sq. ft. Partitions, 199,400 sq. ft. Suspended ceilings. Furring and Wire Lathing.
Second Church of Christ Scientist, New York.	F. R. Comstock,	Flooring, 20,500 sq. ft. Partitions, 26,000 sq. ft. Furring and Wire Lathing.
Office and Warehouse, Park Ave. & 125th St., New York.	C P. H. Gilbert, New York.	Flooring. 104,000 sq. ft. Partitions, 140,900 sq. ft.
Public School No. 175, New York.	C. B. J. Snyder, New York.	Flooring, 54,600 sq. ft. Partitions, 49,000 sq. ft.
Lying-In Hospital, 2nd Ave. & 18th St., New York.	R. H. Robertson, New York.	Flooring, 133,300 sq. ft. Partitions, 9,900 sq. ft.
Residence of Andrew Carnegie, New York.	Babb, Cook & Willard, New York.	Flooring, 53,100 sq. ft.



Ansonia Apartment Hotel, 73rd St. and Broadway, New York.
(The largest apartment Hotel in the World.)
W. E. D. Stokes, Architect.
Roebling fire-proof floors throughout.

Ansonia Apartments, 73d St. and Broadway, New York.	W. E. D. Stokes, New York.	Flooring, 554,600 sq. ft. Furring and wire lathing.
Office Building, Nos. 3 and 7 West 22d St., New York.	J. B. Baker, New York.	Flooring, 73,100 sq. ft.
Engine, Hook and Ladder Building, 77th St., near Columbus Ave , New York.	Horgan & Slattery, New York.	Flooring, 14,900 sq. ft. Partitions, 6,700 sq. ft Wire wall furring.
Durland Riding Academy, West 66th St., New York.	H. F. Kilburn, New York.	Flooring, 20,600 sq. ft.
Apartment House, 61st St. and Madison Ave., New York.	Horgan & Slattery, New York.	Flooring, 72,600 sq. ft.
37th Precinct Police Station, 177th St and Bathgate Ave., New York.	Horgan & Slattery, New York.	Flooring, 19,100 sq. ft. Partitions, 10,400 sq. ft. Wire wall furring.
Eastern Power Station, B. H. E. R. R., Kent & Division Aves., Brooklyn, N Y.	E. H. Packe, Brooklyn, N. Y.	Flooring, 12,700 sq. ft.
Orpheum Theater, Brooklyn, N. Y.	Frank Freeman, New York City.	Flooring, 47,300 sq. ft. Suspended ceiling. Ornamental furring and wire lathing.
Building No. 9, U. S. Navy Yard, Brooklyn, N. Y.	P. C. Asserson, Brooklyn, N. Y.	Flooring, 20,700 sq. ft.



Clark Kindergarten Building, Rivington and Cannon Sts., New York.

Babb, Cook & Willard, Architects.

Roebling fire-proof floors throughout.